

**EXAMINATION OF DETERMINANTS OF HEALTH INFORMATION  
UTILIZATION IN MAKING DECISION AMONG HEALTHCARE  
MANAGERS IN MOMBASA COUNTY, KENYA**

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**A THESIS SUBMITTED TO THE SCHOOL OF MEDICINE AND HEALTH  
SCIENCES IN PARTIAL FULFILLMENT FOR THE DEGREE OF MASTER  
OF SCIENCE IN HEALTH SYSTEMS MANAGEMENT OF KENYA  
METHODIST UNIVERSITY**

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## DECLARATION AND RECOMMENDATION

### Declaration

This Thesis is my original work and has not been presented for a degree in any other university.

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### Recommendation

This Thesis has been submitted for examination with our approval as University Supervisors.

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## **DEDICATION**

This Thesis is dedicated to my family members for their support despite committing most of the resources to my studies. Their support kept me going even in times that I faced the most difficult challenges during my studies.

## **ACKNOWLEDGEMENT**

I first and foremost thank God for the far He has taken me in life and in my studies. I would also like to thank my supervisors, Ms. Lillian Muiruri and Dr. Caroline Kawila (PhD), for making it possible to complete this Thesis. My appreciations also go to the National Commission for Science and Technology Innovation for granting me permission to carry out the research study, Kilifi County Government, through the office of the Director of Medical Services, for giving me permission to carry out a Pre-test for my study and also Mombasa County Government, through the office of the Director of Medical Services, for granting me permission to carry out my research study.

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## ABSTRACT

Information use is paramount for effectively managing today's health systems. Health information has been underutilized hence important decisions related to healthcare mostly rely on other factors other than Routine Health Information Systems. The study was based on the Health Information Systems pillar. The general objective was to examine determinants of health information utilization in making decisions among healthcare managers in Mombasa County. The study had four specific objectives including, to assess technical factors; examine organizational factors; investigate factors related to behavior and to explore factors related to data quality which influence health information utilization in making decisions among healthcare managers in Mombasa County. The study was anchored on the theory of Evidence Based Health Information System. Target population was 303 healthcare managers in public healthcare facilities in Mombasa County. Data was collected from a sample of 91 healthcare managers in Mombasa County. Data was collected using a Semi-structured questionnaire. Observation augmented data collection for dependent variable. Data was analyzed with IBM SPSS Statistics for Windows Version 23. Descriptive statistics was conducted to summarize the results of the study and inferential analysis at a level of significance of  $p < 0.05$  was performed to explain the influence of independent variables on dependent variable. Results were presented using tables, charts and graphs, followed by interpretations and discussions. The results revealed that technical factors ( $\beta_1 = 0.151$ ;  $t = 3.428$ ;  $p < 0.01$ ), organizational factors ( $\beta_2 = 0.233$ ;  $t = 4.552$ ;  $p < 0.01$ ) and data quality factors ( $\beta_4 = 0.298$ ;  $t = 4.079$ ;  $p < 0.01$ ) were significant predictors of health information utilization in making decisions among healthcare managers in Mombasa County. However, factors related to behavior ( $\beta_3 = -0.094$ ;  $t = -1.527$ ;  $p > 0.05$ ) was not significant in predicting health information utilization in making decisions among healthcare managers in Mombasa County. The MOH and Mombasa County Government to conduct regular training on HMIS to enhance managers' skills on HIS. This will also enhance quality of health information generated. The MOH should put more emphasis on HMIS as a subject in the pre-service curriculum for all healthcare cadres; The MOH and Mombasa County Government should allocate more resources for effective implementation of HIS. The study suggests that other studies should be conducted to focus on other factors influencing health information utilization in making decisions.

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## **ABBREVIATIONS AND ACRONYMS**

<b>AIDS:</b>	Acquired Immune-Deficiency Syndrome
<b>AMREF:</b>	Africa Medical Research Foundation
<b>ANOVA:</b>	Analysis of Variance
<b>CGTRH:</b>	Coast General Teaching and Referral Hospital
<b>CHMIS:</b>	Community Health Management Information Systems
<b>CHMT:</b>	County Health Management Team
<b>DHS:</b>	Demographic Health Survey
<b>DHIS:</b>	District Health Information Systems
<b>DHMIS:</b>	District Health Management Information Systems
<b>HIS:</b>	Health Information Systems
<b>HIV:</b>	Human Immune Virus
<b>HMIS:</b>	Health Management Information Systems
<b>HMT:</b>	Hospital/Health Management Team
<b>HODs:</b>	Heads of Departments
<b>HRIOs:</b>	Health Records and Information Officers
<b>IBM:</b>	International Business Machine
<b>IT:</b>	Information Technology
<b>KeMU:</b>	Kenya Methodist University
<b>KEMSA:</b>	Kenya Medical Supplies Authority
<b>M&amp;E:</b>	Monitoring and Evaluation
<b>MOH:</b>	Ministry of Health
<b>MOMS</b>	Ministry of Medical Services
<b>MOPHS:</b>	Ministry of Public Health and Sanitation

<b>NACOSTI:</b>	National Commission for Science, Technology and Innovation
<b>PMTCT:</b>	Prevention of Mother to Child Transmission
<b>RHMIS:</b>	Routine Health Management Information Systems
<b>SCHMT:</b>	Sub-County Health Management Team
<b>SCMOH:</b>	Sub-County Medical Officer of Health
<b>SOPs:</b>	Standard Operating Procedures
<b>SPSS:</b>	Statistical Package for Social Science
<b>TB:</b>	Tuberculosis
<b>USAID:</b>	United States Agency for International Development
<b>WHO:</b>	World Health Organization

# CHAPTER ONE

## INTRODUCTION

### 1.1. Study Background

Health Information System (HIS) is one of the health systems pillars that is very important for health systems strengthening. It is a data collection system specifically designed to support planning, management and decision making in health facilities and organizations (World Health Organization [WHO], 2008a). Reliable and timely health information is essential for policy development, proper health management, evidence-based decision-making, rational use of resources, and the monitoring and evaluation of the public health situation, health care delivery and outcomes (WHO, 2019).

Utility of health information keeps individuals and members of the public informed and empowered to make the right decisions concerning their well-being. It also influences public health policy and decision making; advances skills in developing products and tools to promote, maintain, protect and restore health (WHO, 2014). Therefore, using information to make decisions is very important for continuous improvement in the health system. According to WHO, (2014), healthcare providers in various healthcare organizations, globally, could not perform their duties efficiently and effectively. This was due to underutilization of health information to make their decisions. As a result, there were increased running costs of health facilities due to recurrence of diseases, and inconsistencies in patients' management. Overall, this led to an increased workload on healthcare providers and data collectors hence a compromised quality of healthcare (WHO, 2014).

Health information utilization in Africa ranges between 10 to 56% (Shiferaw et al., 2017). There was a lack of capacity to use data, across Africa, in such a way that

healthcare managers can evaluate the impacts of changes they put in place, (Nyamtema, 2010). In this context, important health decisions depended on disease estimates and burden, besides other factors which influenced the managers' decision making like Demographic Health Survey (DHS). According to Shiferaw et al., (2017), decision making in health depended on reliable data as well as human and financial resources put in place to improve HIS.

In 1997 the Ministry of Health (MOH) established the District Health Management Information Systems (DHMIS) to strengthen HIS. This was to enhance healthcare managers' capacities to carry out their managerial duties with an ultimate goal of improving quality of care (MOH, 2009). In 2013 healthcare functions were devolved to the counties as per the new constitution of 2010. This was aimed at improving the health sector performance. The devolution policy aimed at enhancing availability of comprehensive quality information in order to make evidence-based decisions in the health sector (MOH, 2014).

Health system in Kenya is organized in four policy levels, called tiers, where strategic information is made. Tier one is the Community Level which has no physical facilities; Tier two is the Primary Care Level which comprises the Dispensaries, Health Centers, Maternity Homes and Clinics; Tier three is the County Level which comprises the Sub-County Hospitals, including Non-Governmental Organizations and Private Hospitals; and Tier four is the National Level which is composed of the general, regional or discipline specialists' health facilities.

In Mombasa County all the four levels are available with management structures comprising County health managers, Sub-County health managers and Hospital managers. These are the healthcare managers in the county tasked with the



responsibility of utilizing health information for making decisions at their respective areas of jurisdiction. According to the reviewed literature, determinants of health information utilization in making decisions are grouped into Technical factors, Organizational factors, factors related to Behavior and factors related to Quality data (Tekabe et al., 2009).

## **1.2. Statement of the Problem**

In Kenya, data collected at the health facilities are sent to the higher levels in the health systems (Ministry of Medical Services and Ministry of Public Health and Sanitation [MOMS & MOPHS], 2010). This means that data collectors are not the final users of the generated information. At the same time, out of all the data that was collected, only 7% is analyzed. Even though resources had been allocated for data collection, it was not used to monitor and evaluate the progress made. This resulted to high costs to patients, burn-out among health care providers and low performance on health indicators (MOMS & MOPHS, 2010).

Having acknowledged the critical role played by a functional HIS, in 2010 Kenya's HIS Division at the Ministry of Health was mandated to overhaul the existing system and replaced it with the web-based District Health Information Software (DHIS2). DHIS2 was designed to facilitate generation, analysis and dissemination of quality health information for informed decision making (MOH, 2014). Even though DHIS2 was in place, data was still inaccessible and underutilized by the targeted users in Kenya (Ekirapa et al., 2013).

In Kiambu, Kitui and Mombasa Counties, healthcare workers were unable to access information or reports from the sub-county in time and information for returning

patients was not easily accessible to all service providers simultaneously (Kawila & Odhiambo-Otieno, 2019). At the same time, information on the cost of health care was not readily available in the HMIS. HIS fundamental principle demands that statistical data and health information be made liberal and readily accessible as a “Public good” in a timely manner, and also promotes use of existing data (MOH, 2009).

In Mombasa County there was reliance on HIS reports to monitor and evaluate programs and to carry out certain interventions. For instance, at Coast General Teaching and Referral Hospital (CGTRH), demand for use of available information generated by health workers and managers in making decisions were at a minimum level (Nzomo, 2017). According to Nzomo, (2017), data quality audits reports done at CGTRH showed incomplete data that was underutilized in making decision and what influences information utilization was not known. Report by Kenya Coordinating Mechanism, (2015), stated that underutilization of health information for decision making had resulted in lack of efficiency and effectiveness in provision of healthcare services in Mombasa County.

This is also an under-researched area in Mombasa County since there is little or no documented evidence and literature to show how health information is being utilized in making decisions among healthcare managers, specifically. The study, therefore, sought to examine what determines health information utilization in order to make managerial decisions.

### **1.3. Study Purpose**

The study sought to examine what determines health information utilization in making decisions among healthcare managers in Mombasa County so that the recommendations made from the study can be used to inform adoption and

implementation of measures that would enhance utilization of information in making decisions.

#### **1.4. Research Objectives**

- i. To assess technical factors which influence health information utilization in making decisions among healthcare managers in Mombasa County.
- ii. To examine organizational factors which influence health information utilization in making decisions among healthcare managers in Mombasa County.
- iii. To investigate factors related to behavior which influence health information utilization in making decisions among healthcare managers in Mombasa County.
- iv. To explore factors related to data quality which influence health information utilization in making decisions among healthcare managers in Mombasa County.

#### **1.5. Research Questions**

- i. How does technical factors influence health information utilization in making decisions among healthcare managers in Mombasa County?
- ii. How does organizational factors influence health information utilization in making decisions among healthcare managers in Mombasa County?
- iii. How does factors related to behavior influence health information utilization in making decisions among healthcare managers in Mombasa County?
- iv. How does factors related to data quality influence health information utilization in making decisions among healthcare managers in Mombasa County?

#### **1.6. Justification/Rationale of the Study**

This study is relevant and applicable in Health Systems Management since it focused on strengthening the Health Information Systems' (HIS) pillar. There was a lack of efficiency and effectiveness in provision of healthcare services in Mombasa County by

healthcare workers and managers due to low utilization of health information in making decisions (Kenya Coordinating Mechanism, 2015).

As pointed out by Nzomo, (2017), the factors that influence health information utilization in making decisions at Coast General Teaching and Referral Hospital are not known. This prompted the need to conduct a study that would explore factors which influence health information utilization in making decisions in Mombasa County as a whole and specifically among healthcare managers who are the key decision makers.

The recommendations made will give the best ways to achieve information utilization in decision making to facilitate proper prioritization of health needs. This will enhance formulation and implementation of policies that will ensure effective and efficient health information utilization in managerial support. Public health institutions will also learn that by using health information in making their decisions, they will not only add value to these healthcare organizations but also have an edge over non-public health institutions.

### **1.7. Inclusion Criteria**

The study was conducted among healthcare managers from primary level facilities to County Health Management Team members who agreed to participate in the study by signing the consent forms. The managers were employees working in government institutions.

### **1.8. Exclusion Criteria**

The study did not involve the community level health managers and employees not working in government institutions.

### **1.9. Study Limitations**

The survey was carried out among healthcare managers in government run health institutions from level two of the health system to County Health Management Team (CHMT) members. It is the healthcare managers who plan for the use of this information and data to come up with relevant population situational analysis and risk factors for them to make managerial decisions. The managers were always busy and therefore the issue was how and when to get them in good time and have them respond to the questionnaires. To overcome this, the researcher had to schedule a meeting with the sampled respondents at a time that was convenient to the managers in order to have them respond to the questionnaires. There was also constant communication between the researcher and the respondents as a way of reminding the respondents on the agreed appointments. Patience was also a virtue employed by the researcher.

The study did not focus on the community level managers since they are under the Community Health Management Information System (CHMIS), not HMIS.

### **1.10. Delimitation**

This was a descriptive survey conducted between August and October 2019. It examined determinants of health information utilization in making decisions among healthcare managers in Mombasa County, Kenya. The factors considered included technical factors (managers' skills on HIS and availability of data collection tools), organizational factors (supportive supervision, feedback mechanisms and resources for HIS activities), behavioral factors (perceptions and motivations towards HIS use) and data quality factors (data accuracy, completeness and data timeliness). This study was conducted among healthcare managers in Mombasa County. The managers consisted of CHMT members, Sub-County Health Management Team (SCHMT) members from

the four sub-counties, facility in-charges and Heads of Departments (HODs) within the public health facilities.

### **1.11. Significance of the Study**

Study results will be used to enhance knowledge on the importance of HIS to the health sector. This is so because the study sought to strengthen health information utilization among healthcare managers through understanding of unique strengths and weaknesses. It also provides innovative solutions for improvement of information utilization for decision making in management and health service provision across Kenya. The study also provides literature to academicians to conduct surveys related to HIS.

### **1.12. Assumptions of the Study**

The researcher assumed that he would get support and cooperation from the sampled healthcare managers at all levels. Another assumption was that the researcher would find all the required respondents of the study during the study period. It was also assumed that the managers would be willing to give honest and relevant answers to the study as well as being objective, not subjective. The researcher also assumed that despite the fact that the healthcare managers had busy schedules, they would honor their appointments with the researcher to enable the study to be completed in time.

### **1.13. Operational Definition of Terms**

**Behavior Factors:** Are one's beliefs, motivational factors, perceptions or attitudes towards health information utilization.

**Determinants:** Anything that has an impact (positive or negative) on information use.

**Healthcare Managers:** Are the CHMT, SCHMT, facility in-charges and HODs at the facilities.

**Organizational Factors:** Are issues that are concerned with the structure of the organization, support services, procedures, resources, and culture to manage, develop and improve the use/performance and processes of HIS.

**Primary Care Facilities:** Health Centers and Dispensaries

**Public Health Facilities:** Healthcare facilities owned and managed by either the county governments or national government of Kenya.

**Technical Factors:** Are issues concerning the special knowledge, skills and expertise to build up, run, handle, and increase the use/performance and processes of RHIS as well as the tools used to collect and manage data.

**Quality Data:** Data that has the highest level of accuracy, completely provides the required data sets and is available in time to make decisions.

**Utilization of Health Information:** Making use of information in the day to day managerial activities.

## **CHAPTER TWO**

### **REVIEW OF LITERATURE**

#### **2.1. Introduction**

This is where information relating to health information utilization in making decision was reviewed. Various studies done, in relation to health information utilization in Kenya and other countries globally were reviewed in this chapter. The reviewed literature highlighted the factors and gaps, in health information utilization, that this study sought to explore.

#### **2.2. Technical Factors which influence health information utilization in making decision**

These are determinants regarding knowledge and use of technological skills in developing, managing and improving processes and performance of HIS (Boone et al., 2013). These determinants are concerned with skills to develop and use data collection tools and development of software for data processing and analysis.

##### **2.2.1. Managers' Skills on HIS**

Healthcare managers need to have good knowledge and information technology skills to effectively use and sustain information in making decisions. Managers must be in a position to apply the principles of scientific experimentation to their managerial duties (Harris, 2012). Harris, (2012), further stated that managers must be able to look at data in all aspects which involves competency in gathering, analyzing and interpreting data in the form of numbers and images. The same applies to the healthcare managers.

Individual's inability to analyze and use data is one of the impediments to information utilization in making decisions (Tekabe et al., 2009). Data literacy skills must spread beyond their routine use and become a vital aspect of every managerial activity (Tekabe



et al., 2009). Healthcare workers (managers included), therefore, need to be trained in scientific methods of data gathering, analysis and interpretation in order for the information to be trusted with enough evidence that it is worth being used by healthcare managers (Tekabe et al., 2009). As pointed out by Gopalan et al., (2013), data management specialists were needed at the national level to oversee data quality and standards for collection, data management and utilization of information in making decisions. Health Records and Information Officers (HRIOs) at the peripheries should be responsible for data collection, analysis and timely reporting. However, such responsibilities were often given to already overworked healthcare providers who considered this as an additional task that hindered them from their respective professional duty (Gopalan et al., 2013).

The existing huge gap of knowledge can be associated with inadequate training (which was as high as 81%) among healthcare workers in Tanzania (Nyamtema, 2010). This was attributed to low emphasis on HMIS in the pre-service curricula in medical training institutions in Tanzania (Nyamtema, 2010). Even Dumont et al., (2012), noted that there were problems being experienced for technical information to be conveyed effectively and this was associated with limited numeracy skills. Literacy levels were also low which limited the understanding, acceptance, and usage of information. Messages were also misunderstood if not tailored to suitable language and culture; they were not effective if they did not suggest an action.

Healthcare workers' skills in data analysis needed to be enhanced in order to meet demand for information that was able to measure performance against national priorities and guidelines (Obwocha et al., 2016). This means that training on HIS should be consistent with the level of knowledge and professional background of individual

healthcare workers. There was also a need to bring data producers (healthcare providers) together with data users (healthcare managers) since this was an essential step in strengthening a health information system.

### **2.2.2. Data Collection Tools**

Paper-based HIS could still be used in areas where information technology use was still a challenge to achieve acceptable performance levels (Boone et al., 2013). Data was collected based on patients' health records and reports from various health institutions (United States Agency for International Development [USAID]-Kenya, 2010). Data collection systems can be either manual, electronic or both. Healthcare workers at the facilities prepare monthly reports which they submit to the sub-counties for onward transmission to the counties and then finally from the counties to the MOH. Overall reporting rate from the facilities to the district (counties) was just over 80% (USAID-Kenya, 2010).

Computer systems were considered complex by the majority of healthcare workers. This made it difficult for them to use the computer systems thus ending up using manual paper recording which made the information spoiled and poorly managed (Boone et al., 2013). Rhoda et al., (2010), reiterated that some of the software used in the computer systems were scarce, expensive and complex. Gopalan et al., (2013), reiterated that Information Technology (IT) use in healthcare institutions in the developing countries was a new concept. As a result, such countries still found IT use as complex thus hindering their routine HIS activities.

### **2.3. Organizational Factors which influence health information utilization in making decision**

A well-functioning organization should have systems and infrastructure for improving interpersonal relationships among healthcare workers and managers, providing clear guidelines and defining roles and responsibilities related to HIS thus improving evidence- based decision making (Njoka, 2015).

#### **2.3.1. Feedback Mechanisms on HIS**

As pointed out by Seitio-Kgokwe et al., (2015), lack of feedback mechanisms denies the counties and sub-counties a chance to use their health information to improve service provision. Information generated is supposed to benefit the healthcare management and the facility. Healthcare managers and facilities should be able to get feedback in order to make informed decisions. Although reports were submitted to the MOH, there were no measures in place to ensure that information regarding the reports was communicated back to the reporting facilities (MOH, 2009). Feedback is necessary to complete the cycle of data reporting and involves behavior, expectations, and styles of communication among others (Seitio-Kgokwe et al., 2015). Availability of feedback influences how health information is utilized by health facilities in making decisions (Chaled et al., 2013).

#### **2.3.2. Supportive Supervision on HIS**

Managers should carry out supervision then communicate reports to the facilities on time in order to take relevant actions that are aimed at improving health information utilization (Teklegiorgis et al., 2016). Karijo, (2013), reiterated that there was lack of supportive supervision from the county supervisors either due to staff shortage, due to limited capacity to carry out the supervision or due to lack of resources. This made the cycle of data reporting to be incomplete. However, according to Chorongo, (2016), sub-

county and county health authorities facilitated supportive supervision to primary level centers to ensure that guidelines were adhered to, skills were reinforced and ultimately high-quality services were offered at the facilities.

### **2.3.3. Resources for HIS activities**

Resource availability influences routine health information utilization by healthcare institutions (Gopalan et al., 2013). This sentiment was supported by Kihuba et al., (2014), that health information departments were inadequately financed at facility level. On average only 3% of the total annual income (from cost sharing and government grants) was allocated to the HMIS departments as opposed to a requirement that at least 10% be allocated to HMIS (Kihuba et al., 2014). Even the USAID-Kenya, (2010), noted that there was little allocation of resources for HIS activities, leave alone investment in capacity building in order to create knowledge management that would enhance learning and sharing of experiences and best practices.

## **2.4. Factors related to Behavior which influence health information utilization in making decision**

Behavioral determinants to information need and utilization require indefinable views like perceptions/attitudes and motivational factors that people have concerning health information (Aqil et al., 2009). One needed more than just knowledge and skills in HIS to understand behavioral determinants in using information (Aqil et al., 2009). This means that the behavioral determinants provided crucial insight on whether or not health information was utilized in a health system.

### **2.4.1. Perceptions towards HIS use**

What one has in mind concerning a given duty is likely to affect the duty to be performed. This demonstrated that individuals were not aware of the difference

between the actual or perceived ability in performing a duty (Chaled et al., 2013). Even according to Sezgin and Yildirim, (2014), technology acceptance model used for determining behaviors of users towards particular technologies within the context of HIS showed that actual system use was affected by two main elements; perceived ease of use and perceived usefulness. The main task of the health service provider rotates around their daily clinical job as a technical worker or a healthcare manager. The healthcare providers perceive their extra duties such as surveillance of diseases, keeping of stock, budgeting and evidence-based planning as not important compared to health care provision.

Dumont et al., (2012), also reiterated that health facility managers were gathering data without understanding its utility. This created little appreciation for collecting data. As a result, decision making in healthcare was in most cases based on other factors like Demographic Health Survey (DHS) that were not sensitive to changes occurring abruptly.

#### **2.4.2. Motivations towards HIS use**

Performance of HIS was affected negatively by lack of incentives towards data collection, and lack of understanding of data utility (Aqil et al., 2009). At the same time managers were not interested in utilizing the generated information in their managerial activity. Such behavior ultimately had an influence on the health information utilization. It is, therefore, important to understand collective values associated with the processes of HIS and the related tasks in order to discover opportunities to promote values which encourage RHIS use. By doing so it will eventually improve performance on health information utilization in making decisions.

## **2.5. Factors related to Data Quality which influence health information utilization in making decision**

Quality data has been described by looking at different dimensions, that is, completeness, timeliness and accuracy (Aqil & Lippeveld, 2013). According to Aqil and Lippeveld, (2013), data quality dimensions are dependent on each other and that there are correlations existing among them. This means that if one dimension is considered more important than the others, for one reason or the other, then bias occurs resulting to negative impacts on the other dimensions.

Availability of quality data allowed managers to make accurate decisions. The opposite was true for poor quality data which caused confusion, hindered decision making thus negatively affected organization's performance (Teklegiorgis et al., 2016). It is, therefore, important for managers to know what data they need, how it is generated and its utility. This means that accurate, complete and timely information is essential for managerial activities.

To reduce clinical and medical errors, quality data must always be in place (Carbone, 2009). Quality data is needed to come up with the design of disease prevention, treatment and to track the gains made on the measures put in place. Quality data is, therefore, not only crucial in securing health status description, service provision, and outcome, but also exudes confidence in the HIS among healthcare managers. The better the quality of data, the more managers will have confidence in it, see value in it, and utilize it as a tool in making decisions hence improving the overall health of the general population (Teklegiorgis et al., 2016).

The foundation of all health systems is quality data from healthcare institutions' HIS (Nutley & Reynolds, 2013). Data was always in reports and was not adequately utilized for managerial activities. There was a widespread problem related to quality data and

relying on poor or uncertain quality data led to decisions that were ineffective (Njoka, 2015).

### **2.5.1. Data Accuracy**

Data is considered accurate if it measures what it is intended to measure. Accurate data minimizes error to a negligible level. Accuracy implies that data is certified free of error. In order to be useful, data must be accurate (Aqil & Lippeveld, 2013). Just as Omole (2015), pointed out, if motivational measures concerning data management were not addressed, there would be a negative impact on data quality thus causing major problems to healthcare organizations. Additionally, healthcare organizations should ensure there is accurate data for purposes of accountability and its utility to improve healthcare programs, to survive and prosper in the current dynamic environment.

In a research conducted on data quality in Kenya in 2014 by the division of Health Informatics Monitoring and Evaluation it was concluded that accuracy of summary data and DHIS data was generally low compared to the source documents. This was attributed to several problems which included lack of standardized tools, lack of indicator definitions, lack of SOPs, governance issues and unclear roles and responsibilities (MOH, 2014). According to MOH, (2014), there was only a slight improvement in accuracy of DHIS data against summary sheets despite having qualified HRIOs keying in this data. This was occasioned by lack of aggregation instructions and multiple data generation sites.

### **2.5.2. Data Completeness**

Data is considered complete if it contains all the required data sets with regards to the proportion of reporting departments within facilities or facilities in a county or sub-county. Several studies conducted in Africa pointed to the fact that data completeness was a serious concern (Mate et al, 2009). For instance, in a study conducted in South

Africa on challenges in Preventing Mother-to-Child Transmission (PMTCT) of HIV, there were inconsistencies in the completeness of data reporting for selected PMTCT data elements. Results from the health facilities showed that data were complete at only 50.3%. It was not easy to achieve quality data in third world countries since data from such countries were often not complete and sometimes this was occasioned by inadequate managerial support (Njoka, 2015).

### **2.5.3. Data Timeliness**

Data is considered timely if it is up-to-date and information is available when needed. Timeliness and its related dimensions are usually affected by the way data are collected (Harris, 2014). The more steps and intermediate systems involved in data collection, the more delay the decision makers will experience in receiving the needed information. Data reporting should adhere to the set national timelines (MOH, 2009).

## **2.6. Health Information utilization in making decision**

HIS is an important health systems pillar as it provides data needed for other pillars in order to perform their functions (Abajebel et al., 2011). Utility of health information keeps individuals and members of the public informed and empowered to make individualized health-related decisions. Information also influences public health policy and decision making. It also advances skills in developing products and tools to promote, maintain, protect and restore health. Data utilization in making decisions is the backbone for continuously improving the health systems' performance (WHO, 2014).

Data collected must be processed, disseminated, and utilized to make managerial decisions that are aimed at attaining health goals (WHO, 2014). Healthcare managers should monitor and evaluate measures put in place to implement healthcare policies in



order to come up with informed decisions that can achieve set health targets (Abajebel et al., 2011).

Health information utilization improved free movement and this enhanced patients' access to health care (Karuri et al., 2012). This was so because HIS facilitated abundant and timely communication among stakeholders in the health system. This enhanced health service delivery. According to Omole, (2015), a key component of HIS was surveillance in public health whose main focus was identifying problems and taking corrective measures promptly, for instance during epidemics.

A summary of health information utilization can be extracted from a study done by Wekesa, (2014), where she reiterated that an effective HIS had multiple benefits and enabled healthcare managers to do the following: Detecting and controlling emerging and endemic conditions; monitoring progress towards attainment of health targets; Promoting equity in health; Empowering individuals and communities with timely dissemination of health information; Enhancing quality of services; Strengthening evidence base for formulation of health policies; Enabling innovation through research; Improving governance and mobilizing and allocating resources and ensuring accountability in resource use.

## **2.7. Summary of Literature Review**

The reviewed literature highlighted the factors and gaps, in health information utilization, that this study sought to explore. These were categorized into technical factors, organizational factors, factors related to behavior and factors related to data quality which influence health information utilization in making decisions among healthcare managers.

Inability to produce timely annual data reports; skills gap in HIS, inadequate and unstandardized data collection tools, lack of SOPs on HIS, organization's inability to conduct support supervision, lack of feedback mechanisms, inadequate resource allocation for HIS activities, negative attitude towards health information use, lack of motivation among data generators and poor data quality have impacted negatively on health information utilization in managerial activities (Seitio-Kgokwe et al., 2015). Even Nyamtema, (2010), concurred that the knowledge gap on HIS contributed to underutilization of health information in making decisions.

Reliable policy, routine management decisions and resource allocation in the health sector needed appropriate information from HIS for it to establish whether or not healthcare services related to support systems (equipment, infrastructure and supplies, finance, and human resources) being delivered are of good quality (WHO, 2008b). However, assessments done previously in developing countries pointed out that RHIS was regularly in disarray, and the problems limiting a country's performance include: poor quality data, underutilization of available information, and knowledge gap on data analysis and poor data management practices (Aqil et al., 2009).

Behavioral determinants like one's perception on information had an influence on whether or not information was going to be utilized in making decisions (Aqil et al., 2009). Since behavioral determinants are not definable, their understanding requires interventions beyond capacity building on HIS (Aqil et al., 2009). Reviewed literature on quality data indicated that for healthcare managers to have confidence in using information in their daily managerial duties, data has to be of high quality. Without this confidence, data demand drops and evidence-based decision making does not occur, ultimately the health system's performance suffers (Aqil et al., 2009). In this study,

these factors have been grouped into four; Technical factors, Organizational factors, factors related to Behavior and factors related to Data Quality.

## **2.8. Theoretical Framework**

The study used the theory of Evidence Based Health Information System by Carbone, (2009). It states that managers require evidence in their managerial duties. This means decisions need to be made based on facts derived from quality generated data.

Carbone, (2009), stressed the importance of having HIS theories that enhance adoption of new technologies in health. Evidence based managerial decision-making concepts are not new to the health sector even though in health the use is normally confined to medical purposes. This poses a challenge in utilizing information in other aspects of decision making. This theory as well as other relevant authoritative literature suggests that evidence is key in areas that can easily implement and sustain HIS activities.

Health facilities are managed by health workers who are the key decision makers (Carbone, 2009). This informs the need for training all healthcare workers on HIS as well. According to Carbone, (2009), clinicians are scientifically trained in rational ways of thinking. This empirical rational way of thinking influences clinical practice and behavioral change of a healthcare worker. The theory further asserts that evidence positively affects one's change in behavior and sustaining the change also depends on the evidence put forward.

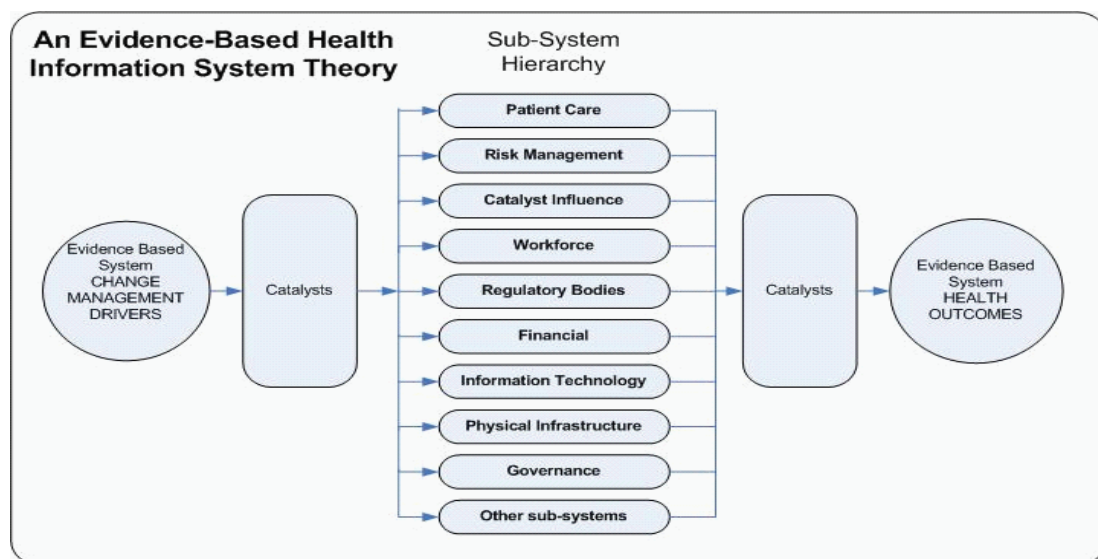
Evidence should represent the main business of patient care having in mind the concerns of healthcare givers and health outcomes. Evidence based systems should be part of the clinical role that has to be performed or improved by adopting HIS. This theory further explains that there is a need for a "catalyst" which is responsible for

ensuring that the overall clinical care task is performed. From the healthcare givers to the health outcomes, the catalyst should ensure that a set of factors are looked into. This allows the task of clinical care to achieve the overall health outcome.

The catalyst plays multiple roles to enable an evidence-based system to succeed. For instance, it enables clinicians (doctors, nurses, among others) to share information; It ensures that risk management systems exist for patient care; It ensures there is a sound financial system which is equivalent to the task performed and measuring the success of care, which is an improved overall health outcome (Aqil et al., 2009).

**Figure 2.1:**

*Theoretical Framework*



Source: Carbone (2009)

**2.9. Conceptual Framework**

This was guided by literature review. According to Aqil et al., (2009), HIS is a crucial pillar in health systems management. It comprises inputs, processes, and outputs that are influenced by factors like organizational, technical, behavior and those related to

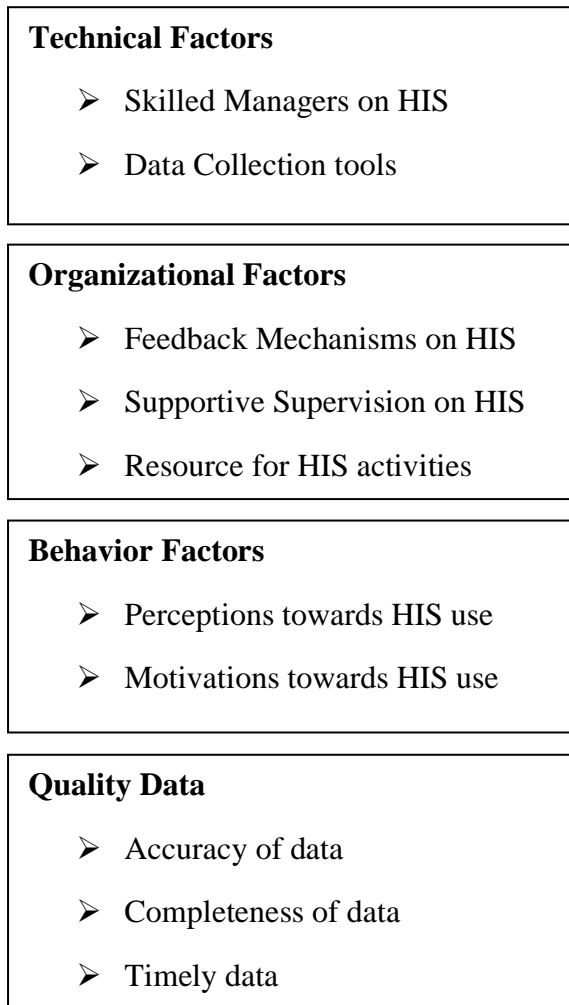
data quality which eventually influence health outcomes. There has been poor quality data in healthcare organizations that have limited resources and certain technical, behavioral, and organizational determinants have been identified as being responsible (Teklegiorgis et al., 2016).

Healthcare workers' skills on HIS and available data gathering tools affect health information utilization in making decisions. At the same time, organizational factors like feedback mechanisms, supportive supervision and availability of resources for HIS activities have an impact on health information utilization among healthcare managers. Behavioral determinants like ones' perceptions and motivations on health information use also have an impact on its utilization among healthcare managers. Finally, there must be quality data in place in order for the healthcare managers to have confidence in its utility in making the right decisions.

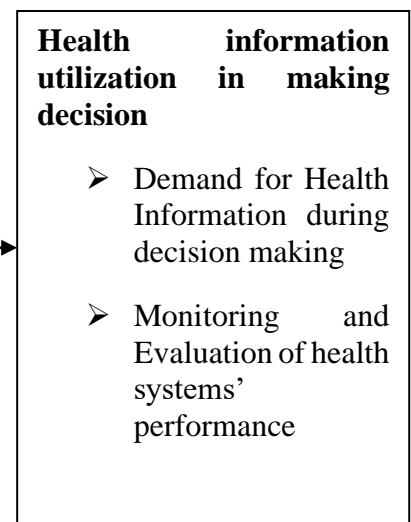
**Figure 2.2:**

*Conceptual Framework*

**Independent Variables**



**Dependent Variable**



**Source: Literature Review**

## **CHAPTER THREE**

### **METHODOLOGY**

#### **3.1. Introduction**

Description of how the researcher conducted the study is explained here. The chapter describes the following subsections; Research Design, Study Location, Study Population, Procedure used in Sampling, Instrumentation, method of data gathering, Study Variables and method used in analyzing data.

#### **3.2. Research Design**

This was a Descriptive study design where desired data was obtained from selected respondents by semi-structured questionnaires. Descriptive survey design provides opportunity for researchers to go deeper and explain and at the same time providing additional information about the research topic and this eliminates bias in data collection (Kothari, 2004). According to Connie, (2009), the descriptive design is helpful at describing what is going on in detail thus enabling understanding of research topics. Data collected through Descriptive Research Study contains in-depth information that is quantitative or qualitative in nature. This allows for multiple approaches to data collection and analysis (Connie, 2009).

#### **3.3. Study Location**

The study was conducted in Mombasa, an island situated in the South Eastern part of the former Coast Province. It is the smallest county in Kenya which covers an area of approximately two hundred and twenty-nine square kilometers, not including sixty-five square kilometers covered with water. It has four sub-counties, that is, Mvita, Likoni, Kisauni/Nyali, and Changamwe/Jomvu. The population is served by 43 public health

facilities; one County Referral Hospital, three Sub-County Hospitals, 14 Health Centres and 25 Dispensaries.

### 3.4. Study Population

The research targeted healthcare managers in Mombasa County. There is a total of 303 healthcare managers in Mombasa County which comprises 21 CHMT members, 56 SCHMT members from the four sub-counties, 43 facility In-Charges from the 43 public health facilities and 183 HODs.

**Table 3.1:**

#### *Target Population*

<b>Healthcare Managers</b>	<b>Target Population</b>
CHMT	21
SCHMT	56
FACILITY IN-CHARGES	43
HEADS OF DEPARTMENT	183

**Source: Department of Health, Mombasa County (2018)**

### 3.5. Sampling Procedure

#### 3.5.1. Sample Size

As recommended by Mugenda and Mugenda, (2003), in a study population not more than 10,000, a sample size of between 10 and 30% is a good representation of the target population. Gall et al., (2015), also recommend use of 30% of the target population to determine sample size.

Therefore, using 30% of the target population

30% of 303=90.9

=91



**Table 3.2:***Sampling Matrix*

<b>Healthcare Managers</b>	<b>Target Population(N)</b>	<b>Sample Size(n) (30%)</b>
CHMT	21	6.3(6)
SCHMT	56	16.8(17)
IN-CHARGES	43	12.9(13)
HODs	183	54.9(55)
<b>TOTAL</b>	<b>303</b>	<b>90.9(91)</b>

**3.5.2. Sampling Technique**

The healthcare managers were categorized into four homogeneous strata (CHMT, SCHMT, Facility In-Charges, and HODs). Multi-stage selection was applied to sample hospitals. A simple random selection to sample health centers and dispensaries was done while Purposive sampling was done to sample the three Sub-County Hospitals (Tudor, Likoni, and Portreitz) and Coast General Teaching and Referral Hospital. Being higher level facilities the number of healthcare managers with varied cadres are more than those in the primary level facilities.

Respondents for the study from different health facilities in the county and departments within the facilities were selected through simple random sampling. At every level, 30% of the managers were selected. A sampling frame was developed by listing the positions of the healthcare managers at every level. Pieces of paper with the written positions were put inside a box mixed then taken out without replacing them back.

**Table 3.3:**

*Sampling Techniques*

	<b>First Sampling Procedure</b>	<b>Second Sampling Procedure</b>
CHMT	Stratified	Simple Random
SCHMT		Simple Random
IN-CHARGES		Simple Random
HODs		Simple Random
County Referral Hospital	Multistage	Purposive
Sub-County Hospitals		Purposive
Health Centres		Simple Random
Dispensaries		Simple Random

**3.6. Instrumentation**

The semi-structured questionnaire was developed based on the study objectives. This offered an effective way of collecting data from large samples in a short period of time cost effectively with an increased chances for a higher response rate. Additionally, questionnaires facilitated easier coding and analysis of data.

The questionnaire consisted of six sections; Section 1 had questions on background information of respondents, section 2 was on Technical Factors, section 3 was on Organizational Factors, section 4 was on the Behavior Factors and section 5 was on Data Quality factors which influence health information utilization in making decision as independent variables. The dependent variable was captured in section 6 where the aspects of health information utilization in making decisions was looked into.

Observation checklist was also used to augment data collection on the dependent variable. This had three sections; section one consisted of the general observation;

section two was on demand for Health Information during decision making; and section three was on Monitoring and Evaluation of health system's performance.

Responses to the questionnaires were measured on an ordinal Likert Scale for the closed ended questions. The questionnaires were accompanied by a consent form which also illustrated the study purpose.

### **3.6.1. Pre-test**

The researcher carried out a pre-test in Kilifi County. This was to ensure that the data collection tools used gathered the needed information, check for consistency and wording of the questions as well as feasibility and effectiveness of the tools and time taken by participants to respond to the questions. As recommended by Melody, (2008), the sample size used for the pre-test should be between the ranges of 10% to 40% of the sample size (that is, 9 – 37 respondents). A total 37 respondents participated in the Pre-test with 97.3% response rate.

The filled questionnaires were checked to improve on the consistency and appropriateness of the wordings and sequencing of the questions. Comments and suggestions from the respondents were considered and the data collection tools refined appropriately.

### **3.6.2. Validity**

Validity is how accurate and meaningful inferences are, based on research results and it encompasses the whole experimental aspect thus establishing whether or not results obtained meet all expectations of research methods (Shuttleworth, 2008). Data collection tools were refined for precision, clarity and inclusiveness to ensure that the scores from a measure represented the variable they were intended to. Validity was established through adequate coverage of the topic under study by the questionnaires

and ensuring the instruments contained a representative sample that could be inferred to the rest of the population. Criterion-related validity was determined by making sure that the information specified by the criterion was collected. Face validity was verified by ensuring that the questionnaires measured the trait of interest. Validity was also increased through the construction of questions that were not scored in the YES or in the NO direction as well as the use of items that do not provoke defensiveness.

### **3.6.3. Reliability**

This is when significant, consistent and stable results are repeatedly achieved with its application on the same object (Shuttleworth, 2008). Coding the data collection instruments and adhering to sampling techniques ensured that random error was avoided.

The study used Cronbach's alpha to measure internal reliability of results across variables. A Cronbach's reliability coefficient of 0.70 or higher was reliable. The study obtained a reliability coefficient of 0.783 which was deemed sufficient to confirm the reliability of the questionnaire.

### **3.7. Methods of Data Collection**

Semi-structured questionnaire was used to collect data. The researcher distributed the questionnaires and at the same time guided the respondents in case of enquiries. It is during this time of distributing the questionnaires that the researcher also collected data using an observation checklist. The researcher then picked the filled questionnaires on the agreed dates with the respondents. The semi-structured questionnaire was considered appropriate because of its cost effectiveness in relation to time taken to respond to them; time taken to analyze the contents; and data was generated from primary sources. It had closed ended questions with a few open-ended questions.

### 3.7.1. Logistical and Ethical Considerations

The necessary clearance and approvals were obtained from the Science and Ethical Review Committee, Kenya Methodist University (KeMU), National Commission for Science, Technology and Innovation (NACOSTI) and the Department of Health, Kilifi and Mombasa County Governments. Notification of the study was sent and confirmed to participants prior to the research. Institutional entry protocol was adhered to.

All the study participants signed a voluntary informed consent. The questionnaires had identification numbers; therefore, no names were used. The respondents were assured of the privacy of information they gave. They were also informed that the information would be used for academic purposes only. The researcher ensured that all meetings were held in venues, dates and times convenient to the participants. The researcher oversaw the overall coordination of the study and all logistical issues were taken care of by the researcher.

### 3.8. Operational Definition of Variables

(i). **Technical factors** which influence health information utilization in making decision among healthcare managers in Mombasa County

<b>Indicator</b>	<b>Measurement</b>	<b>Measuring Scale</b>	<b>Data Collection Tool</b>	<b>Data Analysis</b>
Managers' skills on HIS	Available skilled management staff on HIS	Ordinal Likert	Semi-structured Questionnaire	Descriptive Analysis Inferential Analysis
Data collection tools	Available data collection tools	Ordinal Likert	Semi-structured Questionnaire	Descriptive Analysis Inferential Analysis

(ii). **Organizational factors** which influence health information utilization in making decision among healthcare managers in Mombasa County

<b>Indicator</b>	<b>Measurement</b>	<b>Measuring Scale</b>	<b>Data Collection Tool</b>	<b>Data Analysis</b>
Supportive supervision on HIS	Conducted supportive supervisions on HIS	Ordinal Likert	Semi-structured	Descriptive Analysis
			Questionnaire	Inferential Analysis
Feedback mechanisms on HIS	Available feedback mechanisms on HIS	Ordinal Likert	Semi-structured	Descriptive Analysis
			Questionnaire	Inferential Analysis
Resource availability on HIS	Allocated resources on HIS	Ordinal Likert	Semi-structured	Descriptive Analysis
			Questionnaire	Inferential Analysis

(iii). **Factors related to behavior** which influence health information utilization in making decision among healthcare managers in Mombasa County

<b>Indicator</b>	<b>Measurement</b>	<b>Measuring Scale</b>	<b>Data Collection Tool</b>	<b>Data Analysis</b>
Perceptions towards HIS	Attitude factors on HIS	Ordinal Likert	Semi-structured	Descriptive Analysis
			Questionnaire	Inferential Analysis
Motivations on HIS	Motivational factors that influence HIS	Ordinal Likert	Semi-structured	Descriptive Analysis
			Questionnaire	Inferential Analysis

(iv). **Factors related to quality data** which influence health information utilization in making decision among healthcare managers in Mombasa County

<b>Indicator</b>	<b>Measurement</b>	<b>Measuring Scale</b>	<b>Data Collection Tool</b>	<b>Data Analysis</b>
Accuracy of data	Level of data accuracy	Ordinal Likert	Semi-structured	Descriptive Analysis
			Questionnaire	Inferential Analysis
Completeness of data	Level of data completeness	Ordinal Likert	Semi-structured	Descriptive Analysis
			Questionnaire	Inferential Analysis
Timeliness of data	Level of data timeliness	Ordinal Likert	Semi-structured	Descriptive Analysis
			Questionnaire	Inferential Analysis

(v). **Health information utilization** in making decision among healthcare managers in Mombasa County

<b>Indicator</b>	<b>Measurement</b>	<b>Measuring Scale</b>	<b>Data Collection Tool</b>	<b>Data Analysis</b>
Demand for Health Information during decision making	Availability of decisions made based on the provided Health Information	Ordinal Likert	Semi-structured	Descriptive Analysis
			Questionnaire	Inferential Analysis
			Observation Checklist	
Monitoring and evaluation of health system's performance	Conducted monitoring and evaluation	Ordinal Likert	Semi-structured	Descriptive Analysis
			Questionnaire	Inferential Analysis

### 3.9. Analysis and Presentation of Data

The completed Questionnaires and Observation checklist were observed for compliance with the study objectives. The results were analyzed using the International Business Machine Statistical Package for Social Science (IBM SPSS) Statistics for Windows Version 23, (2015). Information for the different variables was obtained by computing the variables. Cleaning, editing, coding, tabulation, interpretations and recording the variables and synthesizing the information from the data collected to make meaning was also done. In the data analysis, the researcher examined each piece of information in the instrument for completeness, errors and inconsistencies.

Missing data were verified with the original questionnaires. Outputs for the data were generated in the form of descriptive statistical analysis. Inferential statistical analysis was conducted to assess possible influence of the independent variables on the dependent variable. The significance level was set at  $p < 0.05$ . Results were presented in graphs, charts and tables. The regression model was expressed by the equation below.

$$\alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \varepsilon = Y$$

Where  $\alpha$  represents the regression constant;  $\beta_i$  represent the coefficients of the independent variables;  $X_1$  represents technical factors;  $X_2$  represents organizational factors;  $X_3$  represents behavioral factors;  $X_4$  represents data quality factors; and  $\varepsilon$  is the error term;  $Y$  represents the dependent variable (health information utilization in making decision among healthcare managers in Mombasa County).



## **CHAPTER FOUR**

### **RESEARCH FINDINGS, INTERPRETATION AND DISCUSSION**

#### **4.1 Introduction**

Results, interpretation and discussions on determinants of health information utilization in making decisions among healthcare managers in Mombasa County are presented in this chapter. The study was successfully carried out and data analyzed with IBM SPSS statistics for Windows Version 23. The results are displayed in tables, charts and graphs, followed by interpretation and discussion. The results are organized in relation to the study's objectives and presented in various categories as follows:

#### **4.2 Response Rate**

Semi-structured questionnaires were used to collect data among 90(98.9%) healthcare managers out of 91 (100%) randomly sampled managers who met the inclusion criteria in selected public health facilities in the county. Additional information on dependent variable was also obtained through observation using an observation checklist. 98.9% response rate was deemed suitable for this study since a response rate of 50% or more is suitable in representing the views of the target population (Mugenda & Mugenda, 2003).

#### **4.3. Background Information**

The study looked at the socio-demographic characteristics of the respondents and the results are shown below. According to Thakur, (2015), demographic characteristics affect employee performance by evoking differential expectations among them and should, therefore, be seen not as a hindrance but utilized profitably by employers. However, according to Transparency International-Kenya, (2011), socio-demographic

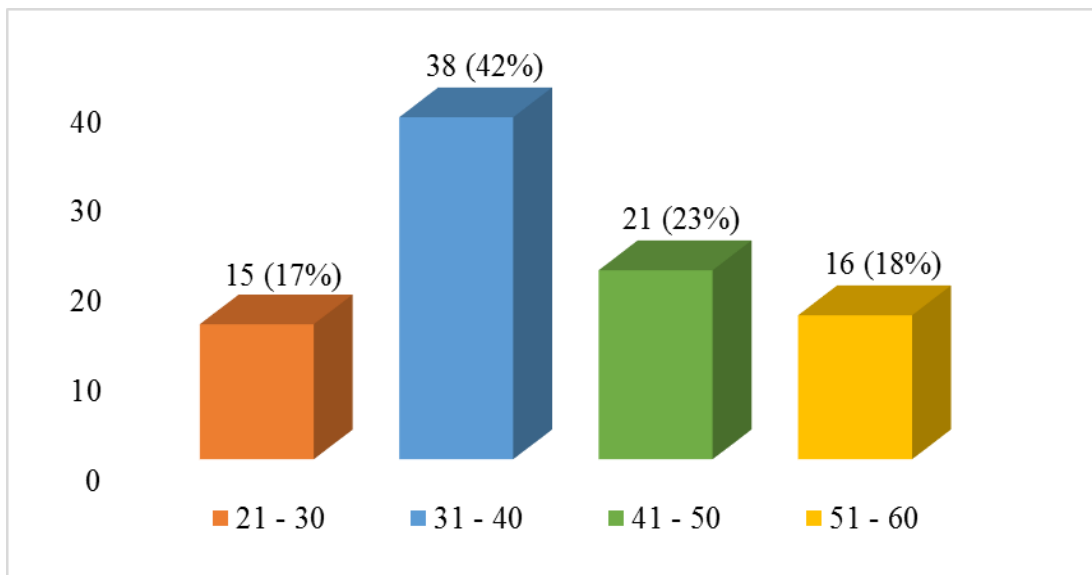
characteristics did not influence data use in making decisions. This implies that information utilization in making decisions is determined by other factors, not one's socio-demographic characteristics.

#### 4.3.1. Age of the Respondents

The results indicate that 15(17%) of the healthcare managers were between 21-30 years, 38(42%) were between 31-40 years, 21(23%) were between 41-50 years while 16 (18%) were between 51-60 years. Figure 4.1. show the results.

**Figure 4.1:**

*Age of the Respondents*



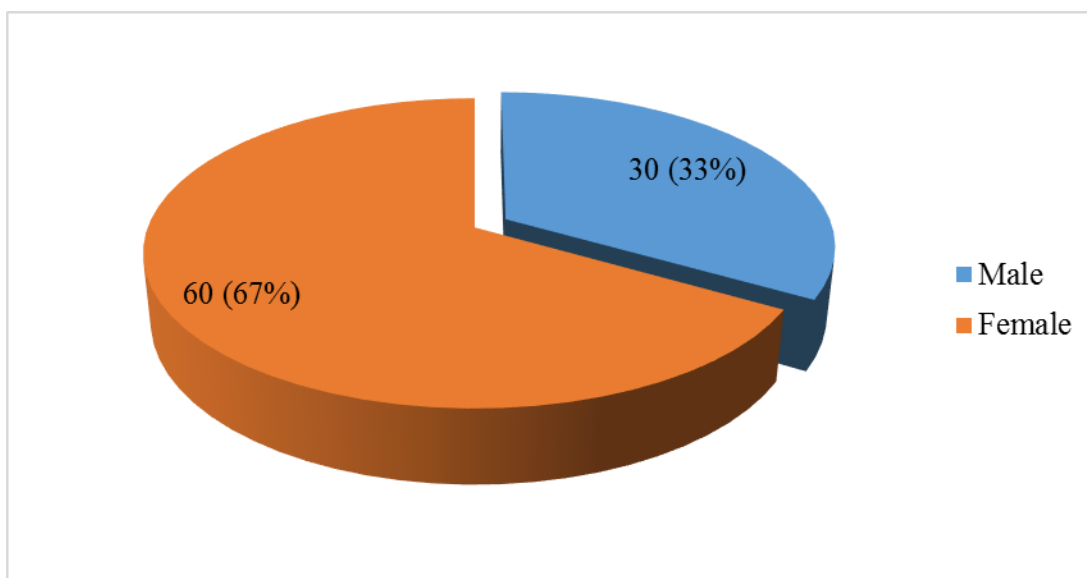
Majority, 38(42%) of the managers were between the ages of 31-40 years. This means that Mombasa County had young generation healthcare managers.

#### 4.3.2. Gender of the Respondents

The results indicate that 60(67%) of the healthcare managers were female compared to 30(33%) who were male. Figure 4.2. shows the gender distribution.

**Figure 4.2:**

*Gender of the Respondents*



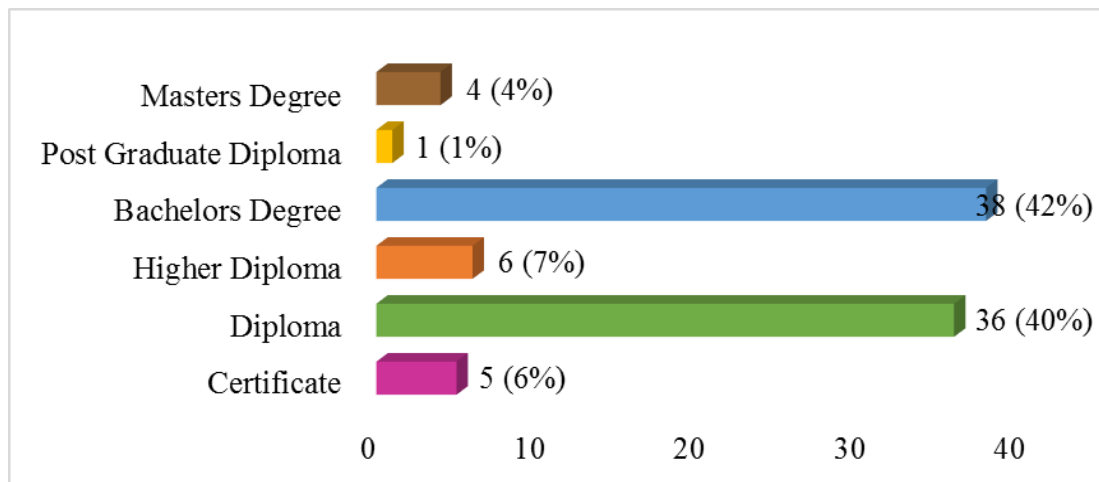
Results indicate that 60(67%) of managers were female while 30(33%) were male. This means that the majority of the healthcare managers in Mombasa County were female. These results coincide with WHO, (2008b), which pointed out that in the health sector, women were over 75% of the health workforce making them the backbone of healthcare service delivery.

**4.3.3. Education level of the Respondents**

Results in Figure 4.3 show that a higher proportion, 38(42%) of the healthcare managers had attained a Bachelor's degree followed by diploma holders who were 36(40%). The results also indicate that 4(4%) were Master's degree holders, 1(1%) were post graduate diploma holders, 6(7%) were higher diploma holders while 5(6%) had attained certificate as their highest education level.

**Figure 4.3:**

*Level of Education of the Respondents*



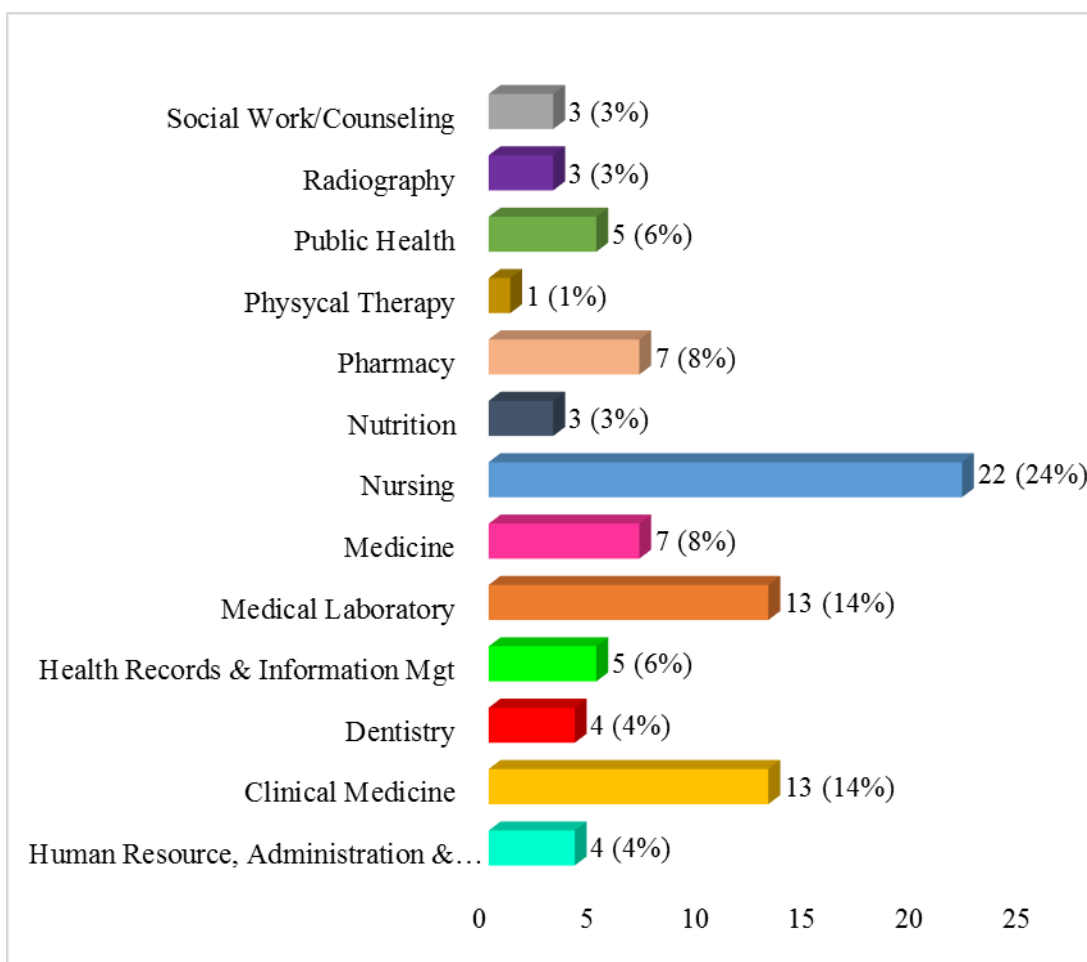
Results indicate that the majority, 38(42%), of the respondents had a bachelors' degree. This means most of the managers were highly educated and well versed with their roles and responsibilities.

**4.3.4 Respondents' Professional Background**

Results shown in Figure 4.4 show that 22(24%) of healthcare managers were Nurses, 13(14%) were Clinical Officers, 13(14%) Laboratory Technologists, 7(8%) Doctors, 7(8%) Pharmacists, 5(6%) Public Health Officers, 5(6%) Health Records Officers, 4(4%) Dentists and those from other professions were 16(19%).

**Figure 4.4:**

***Professional Background of the Respondents***



Professionally, results show that 22(24%) were nurses, which was the majority. This means that the majority of the healthcare managers in Mombasa County were nurses. This finding supports MOH, (2017), report that in Kenya, nurses provide the bulk of the health workforce. According to Obwocha et al., (2016), training on HIS should be consistent with the level of knowledge and professional background of individual healthcare workers.

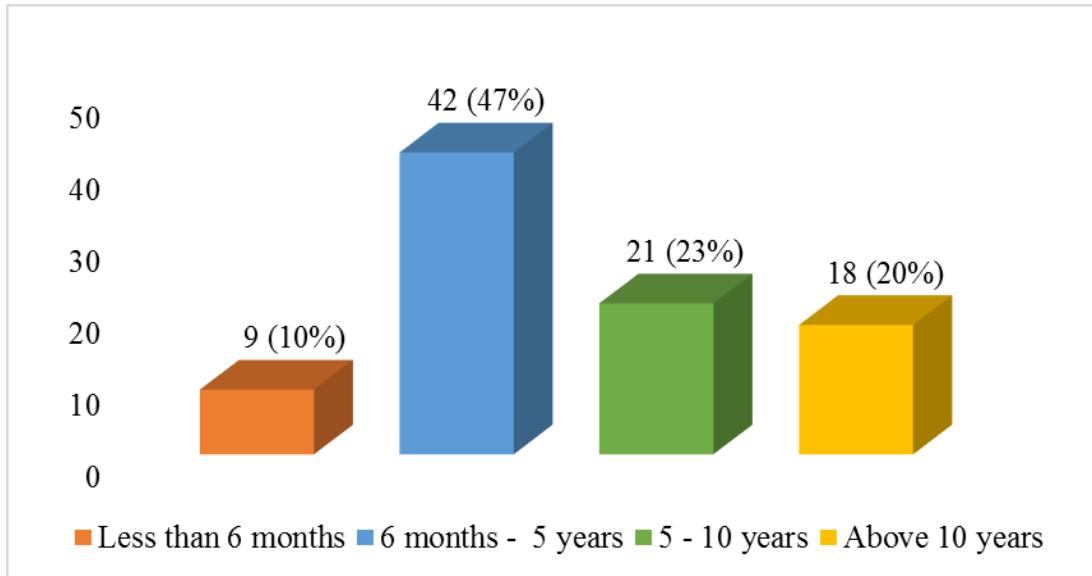
**4.3.5 Respondents' Duration of Service in their present Position**

Results shown in Figure 4.5 indicate that 9(10%) of healthcare managers had served for less than 6 months in their current position, 42(47%) had served between 6 months and

5 years, 21(23%) between 5-10 years while 18(20%) had served for more than 10 years in their current position.

**Figure 4.5:**

***Service Duration of the Respondents***



The study findings indicate that 42(47%) of the managers had served in their current managerial positions for between six months to five years. This means that majority of the managers have utmost 5 years working experience as healthcare managers. This duration was well enough for the managers to understand their roles/responsibilities with regards to HIS.

**4.4 Technical Factors Influencing Health Information Utilization in Making Decision**

First objective was to assess the technical factors which influence health information utilization in making decisions among healthcare managers in Mombasa County. Technical factors considered in this study included availability of skilled management

staff on HIS and availability of data collection tools. The results are presented in the sub-sections below.

#### **4.4.1 Availability of skilled management staff on HIS and Data Collection Tools**

The healthcare managers were required to indicate their level of agreement or disagreement concerning availability of skilled management staff on HIS and availability of data collection tools. The managers' responses were rated on a five-point Likert scale; where 1 depicts Strongly Disagree (SD), 2 depicts Disagree (D), 3 depicts Neutral (N), 4 depicts Agree (A) and 5 depicts Strongly Agree (SA). Frequencies/percentages of the responses were obtained and average and standard deviation calculated to rate their views.

The scale had a width of 0.8  $[(5-1) \div 5]$ , therefore, a score between 1 to 1.8 depicted Strongly Disagree, between 1.81 to 2.6 Disagree, between 2.61 to 3.4 Neutral, between 3.41 to 4.2 Agree, and between 4.21 to 5 Strongly Agree. However, during data analysis, responses for Strongly Disagree and Disagree were merged to depict Disagree while those for Agree and Strongly Agree were merged to depict Agree. This was done across all the study findings. Table 4.1. shows the findings.

**Table 4.1:***Availability of Skilled Management Staff on HIS and Data Collection Tools*

	<b>n</b>	<b>SD</b>	<b>D</b>	<b>N</b>	<b>A</b>	<b>SA</b>	<b>Mean</b>	<b>Std. Dev.</b>
I have been trained on HIS	89	23	26	8	21	11	2.67	1.404
		26%	29%	9%	24%	12%		
I have adequate staff trained on HIS	87	25	30	17	14	1	2.26	1.083
		29%	34%	20%	16%	1%		
I have the skills in data analysis	88	8	14	22	35	9	3.26	1.129
		9%	16%	25%	40%	10%		
I have the skills to interpret data	88	6	8	18	43	13	3.56	1.071
		7%	9%	20%	49%	15%		
I have the skills in data/information presentation	84	6	12	14	43	9	3.44	1.090
		7%	14%	17%	51%	11%		
I use manual system of data collection	85	3	5	10	41	26	3.96	0.993
		4%	6%	12%	48%	31%		
I use standardized tools for data collection	87	5	9	12	39	22	3.74	1.125
		6%	10%	14%	45%	25%		
I have adequate tools for health information management	80	7	27	18	17	11	2.97	1.211
		9%	34%	23%	21%	14%		
Use of IT is complex and this hinders my routine HIS activities	85	24	32	11	14	4	2.32	1.187
		28%	38%	13%	16%	5%		



The results indicate that 49(55%) disagreed that they were trained on HIS. 32(36%) agreed while 8(9%) were neutral. Majority, 55(63%) of the managers disagreed that they had adequate staff trained on HIS. This means that the managers did not acquire HIS skills during pre-service training despite the majority being highly trained professionals. These findings are consistent with findings by Nyamtema, (2010), that 81% of healthcare providers in Tanzania were not trained on HIS as a system for data collection, storage, management and dissemination. Even MOH, (2017), asserted that there were inadequate capacities of HIS staff and unskilled personnel handling data.

The results also indicate that 44(50%) of the managers agreed that they had skills in data analysis, 22(25%) disagreed and 22(25%) were neutral. This means the managers' opinions were widely varied. At the same time, 56(64%) agreed that they had the skills in data interpretation and 52(62%) agreed that they had data presentation skills. These findings concur with that of Dumont *et al.*, (2012), who noted that there were problems being experienced for technical information to be conveyed effectively. This was associated with limited skills on numeracy which minimized the degree to which rates, ratios and percentages were used. Literacy levels were also low which limited the understanding, acceptance, and usage of information. Managers must be able to look at data in all aspects which involves competency in gathering, analyzing and interpreting data in the form of numbers and images (Harris, 2012).

In Mombasa County, 57(79%) of the healthcare managers used manual (paper-based) system of data collection. This was so despite the fact that the managers had knowledge on Information Technology (IT). This means that there were no systems in place to fully embrace IT in HIS activities in the county. The findings are consistent with an assessment conducted by USAID-Kenya in 2010 which established that the data

collection system was mostly manual though there were areas where both manual and electronic systems were used. The manual system exposed the data collected to being misplaced, lost or damaged and therefore, its availability when needed was not guaranteed. Aladdin et al., (2014), also reported that due to the co-existence of both manual and automated processes unintended consequences arose including communication breakdown, creation of more work and even adverse events such as medical errors.

The study established that 61(70%) of healthcare managers agreed that they used standardized data collection tools although the managers had varied opinions on the availability of adequate tools for health information management. This means that the majority of the managers and the health facilities collected data using standardized data collection tools. This is contrary to findings of a research conducted on data quality in Kenya in 2014 by the division of Health Informatics Monitoring and Evaluation which concluded that accuracy of summary data and DHIS data was generally low compared to the source documents and this was aggravated by several systemic issues which included lack of standardized tools, among others (MOH, 2014).

On Information Technology (IT) use, 56(66%) of the managers disagreed with the statement that use of IT was complex and it hindered their routine HIS activities. This means the managers were competent in IT use. This is contrary to assertions by Boone et al., (2013), that computer systems were considered complex by the majority of healthcare workers and this made it difficult for them to use the computer systems thus ending up using manual paper recording. This made the information spoilt and poorly managed. Rhoda et al., (2010), also reiterated that some of the software used in the computer systems were scarce, expensive and complex. Gopalan et al., (2013), also

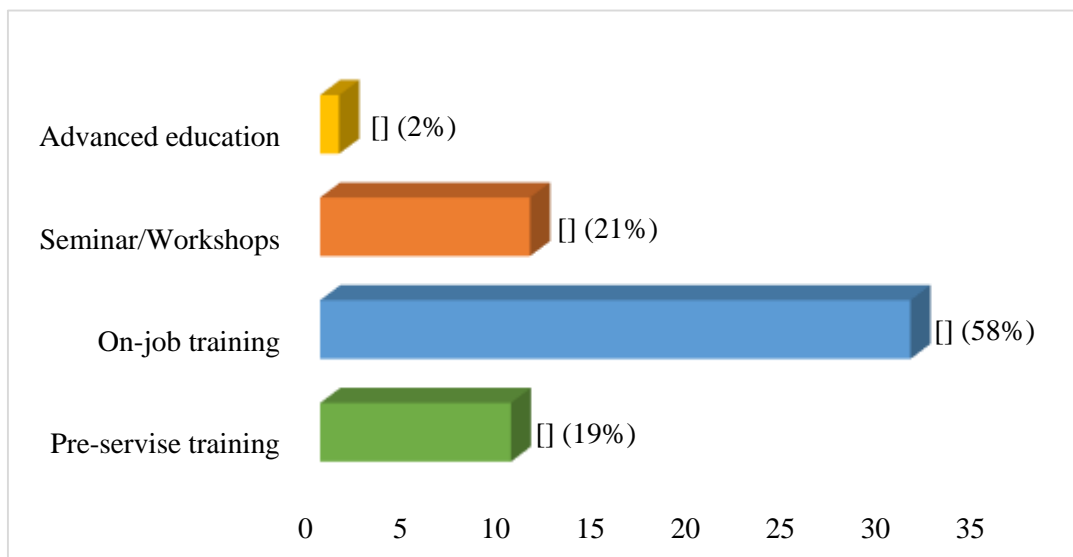
averred that IT use in healthcare institutions in the developing countries was a new concept. As a result, such countries found IT use as complex and this hindered their routine HIS activities.

#### 4.4.2 Modes of Training on HIS

The healthcare managers who confirmed that they were trained on HIS were asked to indicate where they acquired their training. Figure 4.6 presents the results.

**Figure 4.6:**

#### *Modes of Training on HIS*



The results indicate that 31(58%) of the managers acquired skills on HIS through on-job training, 11(21%) through seminars/workshops, 10(19%) through pre-service training while 1(2%) acquired through advanced education. This means that the majority of the managers did not acquire HIS skills during pre-service training. This concurs with Nyamtema, (2010), that there was low emphasis on HMIS at preservice training of healthcare workers.

#### 4.4.3 Reasons for inability to perform Data Analysis

The healthcare managers were asked to indicate some of the reasons why they might not be able to analyze data. The response is shown in Table 4.2 below.

**Table 4.2:**

##### *Reasons for Inability to Perform Data Analysis*

	<b>N</b>	<b>Frequency</b>	<b>%</b>
Complexity of data analysis	90	18	20%
Lack of equipment for data analysis	90	38	42%
Someone else does the analysis	90	46	51%
No need for data analysis	90	2	2%
Not part of my duty	90	1	1%
Not trained on data analysis	90	44	49%

The results indicate that 46(51%) of the healthcare managers failed to do data analysis because someone else did the analysis, 44(49%) failed because they were not trained on data analysis, 38(42%) indicated lack of equipment for data analysis, while 18(20%) attributed the failure to complexity of data analysis. Additionally, 2(2%) of the managers felt there was no need for data analysis while 1(1%) indicated that data analysis was not part of their duty. This means that most of the managers felt that it was not their responsibility to do data analysis. This supports assertions by Gopalan *et al.*, (2013), that health information management responsibilities were often given to already overworked healthcare providers who considered this as an additional task that hindered them from their respective primary professional duty.

#### 4.4.4 Skills Requirement

The healthcare managers were required to indicate any other skills they required apart from the skills in data interpretation, analysis and presentation. Table 4.3 presents the results.

**Table 4.3:**

***Skills Requirement***

	<b>n</b>	<b>Frequency</b>	<b>%</b>
HMIS	90	40	44%
Survey/Research	90	39	43%
Data utilization	90	40	44%
Planning	90	36	40%
Computer software	90	46	51%

The results show that 46(51%) of the healthcare managers required skills in computer software, 40(44%) in data utilization, 40(44%) in HMIS, 39(43%) in survey/research, while 36(40%) of the managers needed skills in planning. This means that the managers needed other skills that would assist them in carrying out their duties effectively and efficiently. As pointed out by Harris, (2012), managers must be in a position to apply the principles of scientific experimentation to their managerial duties (Harris, 2012). Harris, (2012), further states that managers must be able to look at data in all aspects and competencies.

**4.4.5. Relationship between Technical Factors and Health Information Utilization in Making Decision**

Linear regression analysis to determine the degree of influence of availability of skilled staff on HIS and availability of data collection tools on health information utilization in making decision among healthcare managers in Mombasa County was conducted.

These results were also used to determine the inclusion of technical factors as independent variable in the multiple regression analysis at a  $p < 0.2$ . Significance level. According to Sun et al., (1996), a  $p < 0.2$  significance level is recommended when screening risk factors to be used in multivariable analysis.

Regression analysis is used to describe the relationship between a set of independent variables and the dependent variables (Freedman, 2009). It produces a regression equation where the coefficients represent the relationship between each independent variable. The regression analysis findings are shown in Tables 4.4, 4.5 and 4.6 below.

**Table 4.4:**

***Regression Model Summary of Technical Factors on Health Information Utilization in Making Decision***

<b>Model</b>	<b>R</b>	<b>R Square</b>	<b>Adjusted R Square</b>	<b>Std. Error of the Estimate</b>
1	.533 <sup>a</sup>	.284	.267	.329

a. Predictors: (Constant), Managers' Skills on HIS, Data Collection Tools

The results ( $R^2 = 0.284$ ) in Table 4.4 indicate that approximately 28.4% of the variation in health information utilization in making decisions among healthcare managers in Mombasa County was explained by changes in technical factors (managers' skills on HIS and data collection tools).

**Table 4.5:*****ANOVA of Technical Factors on Health Information Utilization in Making Decision***

<b>Model</b>	<b>Sum of Squares</b>	<b>Df</b>	<b>Mean Square</b>	<b>F</b>	<b>Sig.</b>
1 Regression	3.652	2	1.826	16.869	.000 <sup>b</sup>
Residual	9.200	85	.108		
Total	12.851	87			

a. Dependent Variable: Health Information utilization in making decision

b. Predictors: (Constant), Managers' Skills on HIS, Data Collection Tools

The results of the ANOVA test ( $F[2, 85] = 16.869, p < .01$ ) in table 4.5 indicate that, at 95% confidence level, the regression model (managers' skills on HIS and data collection tools) was significant in predicting health information utilization in making decisions among healthcare managers in Mombasa County.

**Table 4.5:*****Coefficients of Technical Factors on Health Information Utilization in Making Decision***

<b>Model</b>	<b>Unstandardized Coefficients</b>		<b>Standardized Coefficients</b>	<b>t</b>	<b>Sig.</b>
	<b>B</b>	<b>Std. Error</b>	<b>Beta</b>		
1 (Constant)	2.245	.169		13.305	.000
Managers' Skills on HIS	.095	.045	.219	2.134	.036
Data Collection Tools	.205	.053	.397	3.857	.000

a. Dependent Variable: Health Information utilization in making decision

Regression coefficients shown in Table 4.6 indicate that, at  $p < 0.2$ , managers' skills on HIS ( $\beta_1 = 0.095$ ;  $t = 2.134$ ;  $p < 0.05$ ) and available data collection tools ( $\beta_2 = 0.205$ ;  $t = 3.857$ ;  $p < 0.01$ ) had significant positive influence on health information utilization in making decisions among healthcare managers in Mombasa County (when the interaction of the other independent variables is not controlled).

These results support assertions of Tekabe et al., (2009), that an individual's skills gap in data analysis and use was an impediment to information utilization. According to Tekabe et al., (2009), health information could only be useful to managers if it was evidence based. It means that healthcare workers (managers included) need to be trained in scientific methods of data gathering, analysis and interpretation since this will instill confidence in them to use health information in making decisions. Even Harris, (2012), averred that managers must be in a position to apply the principles of scientific experimentation to their managerial duties. At the same time, the managers must be able to look at data in all aspects and be competent in gathering, analyzing and interpreting data in the form of numbers and images.

#### **4.5. Organizational Factors which influence Health Information Utilization in Making Decision**

Second objective was to examine organizational factors which influence health information utilization in making decisions among healthcare managers in Mombasa County. The organizational factors considered in this study included feedback mechanisms on HIS, supportive supervision on HIS and resource availability on HIS. Results are shown in the sub-sections below.

##### **4.5.1. Availability of Feedback Mechanisms, Supportive Supervision and Resources on HIS**



The healthcare managers were required to respond to statements concerning availability of feedback mechanisms on HIS, supportive supervision on HIS and resource availability on HIS. The managers' responses were rated on a five-point Likert scale; where 1 depicts Strongly Disagree (SD), 2 depicts Disagree (D), 3 depicts Neutral (N), 4 depicts Agree (A) and 5 depicts Strongly Agree (SA). Frequencies/percentages of the responses were obtained and average and standard deviation calculated to rate their views.

The scale had a width of 0.8  $[(5-1) \div 5]$ , therefore, a score between 1 to 1.8 depicted Strongly Disagree, between 1.81 to 2.6 Disagree, between 2.61 to 3.4 Neutral, between 3.41 to 4.2 Agree, and between 4.21 to 5 Strongly Agree. Responses are shown in Table 4.7.

**Table 4.6:*****Availability of Feedback Mechanisms, Supportive Supervision and Resources on HIS***

	<b>N</b>	<b>SD</b>	<b>D</b>	<b>N</b>	<b>A</b>	<b>SA</b>	<b>Mean</b>	<b>Std. Dev.</b>
There are feedback mechanisms on health information utilization	86	3 3%	13 15%	15 17%	46 53%	9 10%	3.52	0.991
There is sharing of best practices on HIS	87	4 5%	11 13%	28 32%	38 43%	6 7%	3.36	0.952
Feedback on HIS is only from the lower level managers to the top-level managers	86	17 20%	29 34%	14 16%	19 22%	7 8%	2.65	1.253
As managers, we hold meetings with stakeholders to discuss HIS	87	4 5%	8 9%	31 36%	39 45%	5 6%	3.38	0.905
As managers, we review reports on HIS	85	3 4%	7 8%	16 19%	47 55%	12 14%	3.68	0.941
As a manager I offer supportive supervision on HIS activities	89	5 6%	12 13%	23 26%	36 40%	13 15%	3.45	1.077
There is recognition and reward systems for good performance on HIS	89	17 19%	31 35%	22 25%	16 18%	3 3%	2.52	1.099
There is adequate resource allocation for support supervision on HIS (financial, human, infrastructure and supplies)	88	27 31%	23 26%	22 25%	10 11%	6 7%	2.38	1.225

Results indicate that 55(63%) of healthcare managers agreed that there were feedback mechanisms on health information utilization. This means there were pathways that ensured information was shared. At the same time 46(54%) of the managers disagreed that feedback was only from the lower level to top level managers. Feedback was given in the form of reports from the lower level managers to higher level managers and vice versa. There were those disseminated either weekly, monthly, quarterly or annually. This is contrary to assertions by the MOH, (2009), which stated that although reports from health facilities were submitted to the MOH, there were no mechanisms in place to ensure this information was shared with the reporting facilities. As pointed out by Seitio-Kgokwe et al., (2015), lack of feedback mechanisms denied the counties and sub-counties a chance to use their health information to improve service provision. Information generated is supposed to benefit the healthcare management and the facility. Healthcare managers and the facilities should be able to get feedback in order to make informed decisions (Seitio-Kgokwe et al., 2015).

Results show varied opinions regarding holding meetings with stakeholders to discuss HIS and on sharing best practices on HIS. 44(50%) agreed that they held meetings with stakeholders to discuss HIS, 12(14%) disagreed while 31(36%) were neutral. 44(50%) agreed that they shared best practices on HIS, 15(18%) disagreed while 28(32%) were neutral.

Results also show that 59(69%) of the managers agreed that they reviewed reports on HIS. This concurs with MOH, (2014), that the Health Sector M&E Framework was developed to guide counties in developing their own HIS M&E plans and strategic guidelines. The framework stated that data review and data use should be strengthened

at all levels, and stakeholders should discuss ways in which data had been used in the period preceding the meeting in order to aid in decision-making.

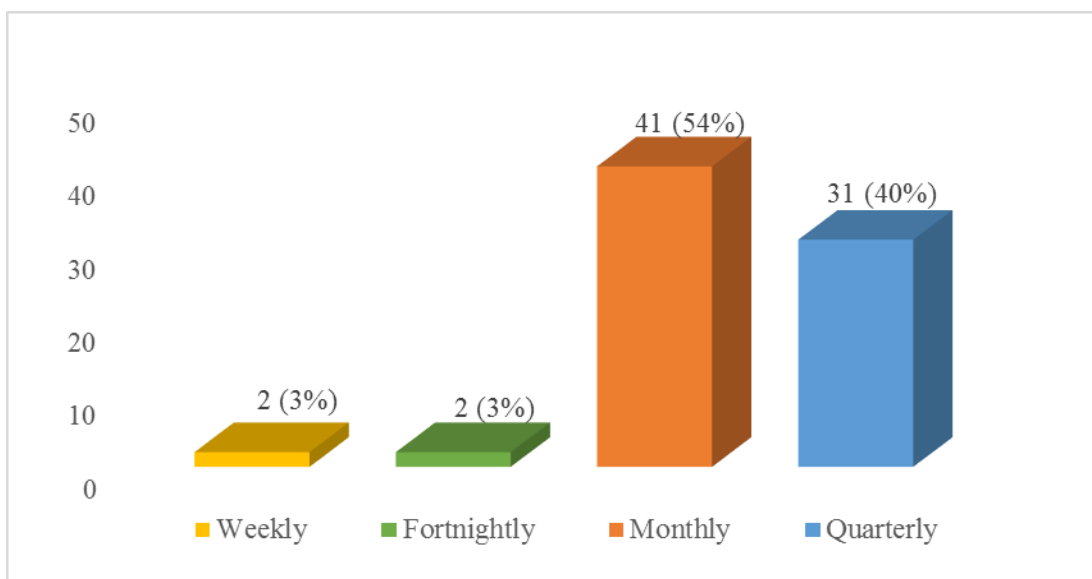
Results also show that 48(54%) of the healthcare managers disagreed that there were recognition and reward systems for good performance on HIS. 50(57%) of the managers also disagreed that there was adequate resource allocation for support supervision on HIS. These results support sentiments by Aqil et al., (2009), that in most developing countries HIS data was burdened by major problems ranging from inadequate human resources and lack of data ownership occasioned by health workers' perception that the purpose of HIS was simply to enable submission of reports to the higher levels. This led to a situation where there was no incentive for health workers to analyze, use and interpret health data.

#### 4.5.2. Frequency of Meetings for Discussing/Reviewing Reports on HIS

Healthcare managers were asked to indicate how often they held meetings to discuss/review reports on HIS. The response is shown in Figure 4.7 below.

**Figure 4.7:**

*Frequency of Meetings to Discuss/Review HIS Reports*



Results show that 41(54%) of healthcare managers who confirmed to holding meetings to discuss/review HIS reports indicated that the meetings were held monthly, 31(40%) indicated that the meetings were conducted quarterly, while 2(3%) of the managers indicated fortnightly and 2(3%) indicated weekly. This confirms that managers hold meetings to review their data/reports.

A data review is a process of thoroughly examining data routinely (monthly, quarterly, biannually, and annually) to provide feedback on data quality and data use comparing performance targets and achievements, discussing appropriate action on using data for making decision, and sharing the information with stakeholders (MEASURE-Evaluation PIMA, 2017). The reviews were led by the CHMT, SCHMT and health facility managers.

Concerning supportive supervision, 49(55%) of healthcare managers in Mombasa County agreed that they carried out supportive supervision on HIS activities. There was internal supportive supervision at facility level by Health Records and Information Officers (HRIOs) or officers responsible for information management and facility in-charges. External supportive supervision was carried out by Sub-county and County Health Management Team members.

The findings support the assertion by Chorongu, (2016), that supportive supervision was facilitated by sub-county and county management teams. These, however, contravene findings by Karijo, (2013), that there was lack of supportive supervision due to staff shortage, limited capacity to carry out the supervision and lack of resources to carry out the supervision. This implies that with adequate resource availability, healthcare managers were able to carry out supportive supervision. According to Teklegiorgis et al., (2016), managers should carry out supportive supervision then

communicate reports to the facilities in time in order to take relevant actions that are aimed at improving health information utilization.

#### **4.5.3. Areas of Focus in Supportive Supervision on HIS**

Healthcare managers were also required to respond to statements concerning the focus of supportive supervision on certain areas of HIS. The managers' responses were rated on a five-point Likert scale; where 1 depicts Strongly Disagree (SD), 2 depicts Disagree (D), 3 depicts Neutral (N), 4 depicts Agree (A) and 5 depicts Strongly Agree (SA). Frequencies/percentages of the responses were obtained and average and standard deviation calculated to rate their views. The width of every point in the scale is  $0.8 [(5-1) \div 5]$ , therefore, a score between 1 to 1.8 depicted Strongly Disagree, between 1.81 to 2.6 Disagree, between 2.61 to 3.4 Neutral, between 3.41 to 4.2 Agree, and between 4.21 to 5 Strongly Agree. Responses are shown in Table 4.8.

**Table 4.7:**  
*Areas of Focus in Supportive Supervision on HIS*

	<b>n</b>	<b>SD</b>	<b>D</b>	<b>N</b>	<b>A</b>	<b>SA</b>	<b>Mean</b>	<b>Std. Dev.</b>
Enhancing technical competency on HIS	88	1 1%	8 9%	22 25%	42 48%	15 17%	3.7	0.899
Assess the quality of the generated data/information	89	1 1%	4 4%	9 10%	56 63%	19 21%	3.99	0.776
Ensuring that health facility's performance is based on generated health data	90	2 2%	2 2%	17 19%	52 58%	17 19%	3.89	0.813
Ensuring that patients' management is based on generated health data	88	1 1%	2 2%	16 18%	57 65%	12 14%	3.88	0.708
Resource allocation/reallocation based on health information	89	4 4%	7 8%	21 24%	44 49%	13 15%	3.62	0.983
sharing of best practices on HIS	88	6 7%	2 2%	16 18%	47 53%	17 19%	3.76	1.017

The results indicate that 57(65%) of the healthcare managers agreed that supportive supervision focused on enhancing technical competency on HIS while 74(84%) agreed that the supervision focused on assessing data/information quality. 69(77%) of the managers agreed that support supervision focused on making sure that health facility/facilities' performance was based on Health Information while 69(79%) of the managers agreed that supportive supervision focused on ensuring that patients' management was based on Health Information. 57(64%) of the managers agreed that support supervision focused on ensuring that resource allocation/reallocation was based on Health Information while 64(72%) agreed that the focus was on sharing of best

practices on HIS. This means that the managers carry out supportive supervision in trying to make things work, rather than checking to see what is wrong.

The findings concur with WHO, (2008b), that supportive supervision was a process of assisting staffs to better their own work performance continuously and should be carried out respectfully without dictatorship with a focus on using supervisory visits as a chance to improve knowledge and skills of staffs. Supportive supervision encourages feedback and building team approaches that enhance problem-solving. It focuses on monitoring performance towards goals, and using data for decision-making. It depends upon regular follow-up with staffs to ensure they work towards achieving organizations' goals.

On resource availability for HIS activities, 50(57%) of the healthcare managers in Mombasa County disagreed that there were adequate resources allocated for HIS activities. There was little, if any, funds allocated for HIS activities. There was also a shortage of human resources for health for HIS activities. For instance, not all primary health facilities in Mombasa County had HRIOs. The results support sentiments by Kihuba et al., (2014), that HMIS departments within health facilities were inadequately financed where only 3% of the total annual budget was being allocated to the HMIS departments. USAID-Kenya, (2010), also noted that there was inadequate resource allocation not only for HMIS but also for some simple activities like publications and distribution of reports. Resource availability has an influence on routine health information utilization by healthcare institutions (Gopalan et al., 2013).

#### **4.5.4. Relationship between Organizational Factors and Health Information Utilization in Making Decision**



Linear regression analysis to assess the degree of influence of availability of feedback mechanisms, supportive supervision and resources on health information utilization in making decisions among healthcare managers in Mombasa County was conducted. Results were also used to determine the inclusion of organizational factors as independent variable in multiple regression analysis at a  $p < 0.2$  level of significance. Results are shown in Tables 4.9, 4.10 and 4.11.

**Table 4.8:**

***Regression Model Summary of Organizational Factors on Health Information Utilization in Making Decision***

	<b>R</b>	<b>R Square</b>	<b>Adjusted R Square</b>	<b>Std. Error of the Estimate</b>
1	.673 <sup>a</sup>	.452	.432	.285

a. Predictors: (Constant), Feedback Mechanisms on HIS, Supportive Supervision on HIS, Resource Availability on HIS

The results ( $R^2 = 0.452$ ) in Table 4.9 indicate that approximately 45.2% of the variation in health information utilization in making decision among healthcare managers in Mombasa County was explained by changes in organizational factors (available feedback mechanisms on HIS, supportive supervision on HIS and resource for HIS activities).

**Table 4.9:*****ANOVA of Organizational Factors on Health Information Utilization in Making Decision***

<b>Model</b>	<b>Sum of Squares</b>	<b>df</b>	<b>Mean Square</b>	<b>F</b>	<b>Sig.</b>
1 Regression	5.581	3	1.860	22.847	.000 <sup>b</sup>
Residual	6.759	83	.081		
Total	12.340	86			

a. Dependent Variable: Health Information utilization in making decision

b. Predictors: (Constant), Feedback Mechanisms on HIS, Supportive Supervision on HIS, Resource Availability on HIS

Results of the ANOVA test ( $F[3, 83] = 22.847, p < .01$ ) in table 4.10 indicate that, at 95% confidence level, the regression model (feedback mechanisms on HIS, supportive supervision on HIS and resource for HIS activities) was significant in predicting health information utilization in making decisions among healthcare managers in Mombasa County.

**Table 4.10:*****Coefficients of Organizational Factors on Health Information Utilization in Making Decision***

		<b>Unstandardized Coefficients</b>		<b>Standardized Coefficients</b>	<b>t</b>	<b>Sig.</b>
		<b>B</b>	<b>Std. Error</b>	<b>Beta</b>		
1	(Constant)	1.844	.197		9.359	.000
	Feedback Mechanisms on HIS	.155	.053	.251	2.922	.004
	Supportive Supervision on HIS	.208	.054	.373	3.844	.000
	Resource Availability on HIS	.079	.029	.254	2.672	.009

a. Dependent Variable: Health Information utilization in making decision

Regression coefficients shown in Table 4.11 indicate that, at  $p < 0.2$ , feedback mechanisms on HIS ( $\beta_1 = 0.155$ ;  $t = 2.922$ ;  $p < 0.01$ ), supportive supervision on HIS ( $\beta_2 = 0.208$ ;  $t = 3.844$ ;  $p < 0.01$ ) and resource availability on HIS ( $\beta_3 = 0.079$ ;  $t = 2.672$ ;  $p < 0.01$ ) had significant positive influence on health information utilization in making decision among healthcare managers in Mombasa County (when interaction of the other independent variables is not controlled).

These results support findings by Chaled et al., (2013), that the level of health information utilization in making decisions by healthcare institutions was influenced by the existence of feedback and access to timely reports. Seitio-Kgokwe et al., (2015), also averred that counties and sub-county facilities had chances of health information utilization to enhance service provision if there were assured feedback pathways.

On support supervision, Teklegiorgis et al., (2016), reiterate that managers should carry out supervision then communicate reports to the facilities on time in order to take relevant actions that are aimed at improving health information utilization. The results also support findings of Gopalan et al., (2013), that human and financial resource availability influenced health information utilization by health facilities.

#### **4.6. Factors related to Behavior which influence Health Information Utilization in Making Decision**

Third objective was to investigate factors related to behavior which influence health information utilization in making decisions among healthcare managers in Mombasa County. The behavioral factors considered in this study included perceptions/attitudes towards HIS and motivational factors towards HIS. The sub-sections below show the results.

##### **4.6.1. Perceptions towards HIS**

Healthcare managers were required to respond to statements concerning their perceptions towards HIS. The managers' responses were rated on a five-point Likert scale; where 1 depicts Strongly Disagree (SD), 2 depicts Disagree (D), 3 depicts Neutral (N), 4 depicts Agree (A) and 5 depicts Strongly Agree (SA). Frequencies/percentages of the responses were obtained and average and standard deviation calculated to rate their views.

The scale had a width of 0.8  $[(5-1) \div 5]$ , therefore, a score between 1 to 1.8 depicted Strongly Disagree, between 1.81 to 2.6 Disagree, between 2.61 to 3.4 Neutral, between 3.41 to 4.2 Agree, and between 4.21 to 5 Strongly Agree. Responses are shown in Table 4.12.

**Table 4.11:***Perceptions towards HIS Use*

	<b>n</b>	<b>SD</b>	<b>D</b>	<b>N</b>	<b>A</b>	<b>SA</b>	<b>Mean</b>	<b>Std. Dev.</b>
Not necessary since there are other basis for decision making in health systems	85	22 26%	41 48%	12 14%	9 11%	1 1%	2.13	0.96 1
It is a very tedious process; from data collection, data analysis, information generation.	89	16 18%	25 28%	21 24%	22 25%	5 6%	2.72	1.18 7
It is a complex and boring process	85	24 28%	37 44%	17 20%	7 8%	0 0%	2.08	0.90 3
It is not my work; it's someone else's responsibility	87	27 31%	30 34%	9 10%	14 16%	7 8%	2.36	1.29 4
Health information utilization in decision making is a burden to my work	89	22 25%	50 56%	11 12%	5 6%	1 1%	2.02	0.83 9
Health information can be used to monitor my work so I don't advocate for its use	89	41 46%	34 38%	5 6%	5 6%	4 4%	1.84	1.06 5
Health information can be utilized for medico-legal issues facing healthcare systems, so it is necessary	88	2 2%	5 6%	9 10%	50 57%	22 25%	3.97	0.89
Health information can be utilized in planning for all healthcare activities so its use should be encouraged	88	1 1%	3 4%	1 1%	47 53%	36 41%	4.3	0.76 1
Health information utilization requires expertise on HIS	87	3 3%	15 17%	18 21%	37 43%	14 16%	3.51	1.06 6
Health information utilization should not be a reserve for the healthcare managers only	89	4 4%	3 3%	8 9%	44 49%	30 34%	4.04	0.98 8

Results indicate that 63(74%) of healthcare managers disagreed that HIS was not necessary since there were other bases for decision making in health systems. 41(46%) of the managers also disagreed that HIS was a tedious process while 61(72%) disagreed that HIS was complex and boring. 57(65%) of the managers disagreed that HIS was not their work; someone else should be responsible for HIS activities while 72(81%) disagreed that health information utilization in decision making was a burden to their work. 75(84%) of the managers disagreed that they don't advocate for the use of health information because it could be utilized as a way to monitor their work.

These results imply that healthcare managers in Mombasa County had a positive attitude towards HIS use in their managerial activities. The results support technology acceptance model used for determining behaviors of users towards particular technologies within the context of HIS (Sezgin & Yildirim, 2014). The model showed that actual system use was affected by two main elements, perceived ease of use and perceived usefulness.

On the other hand, 72(82%) of the managers agreed that HIS is necessary because health information can be utilized for medico-legal issues facing healthcare systems while 83(94%) agreed that HIS use should be encouraged because health information can be utilized in planning for all healthcare activities. Results also show that 51(59%) of the managers agreed that health information utilization requires expertise on HIS while 74(83%) of the managers agreed that health information utilization for decision making should not be a reserve for the healthcare managers only.

These results imply that healthcare managers in Mombasa county understood the utility of HIS use in their duties, the need to have relevant skills on HIS and the need for all healthcare workers to utilize health information in making their decisions. The findings

are contrary to assertions of Chaled et al., (2013), that individuals were not aware of the difference between the actual or perceived ability in performing a duty. The results are also not consistent with assertions of Dumont et al., (2012), that health facility managers were gathering data without understanding its utility.

#### **4.6.2. Basis for Decision Making in HIS**

Healthcare managers were requested to respond to statements concerning various factors that formed their basis for making decisions in health systems. The managers' responses were rated on a five-point Likert scale; where 1 depicts Strongly Disagree (SD), 2 depicts Disagree (D), 3 depicts Neutral (N), 4 depicts Agree (A) and 5 depicts Strongly Agree (SA). Frequencies/percentages of the responses were obtained and mean and standard deviation calculated to rate their views.

The scale had a width of 0.8  $[(5-1) \div 5]$ , therefore, a score between 1 to 1.8 depicted Strongly Disagree, between 1.81 to 2.6 Disagree, between 2.61 to 3.4 Neutral, between 3.41 to 4.2 Agree, and between 4.21 to 5 Strongly Agree. Responses are shown in Table 4.13.

**Table 4.12:*****Basis for Making Decision in Health Systems***

	<b>N</b>	<b>SD</b>	<b>D</b>	<b>N</b>	<b>A</b>	<b>SA</b>	<b>Mean</b>	<b>Std. Dev.</b>
Evidence/facts	90	0 0%	0 0%	2 2%	41 46%	47 52%	4.5	0.546
Political opinions	90	25 28%	31 34%	17 19%	13 14%	4 5%	2.33	1.161
Health needs	90	1 1%	0 0%	3 3%	45 50%	41 46%	4.39	0.665
Donor demands	90	4 5%	21 23%	26 29%	27 30%	12 13%	3.24	1.095
Community demands	90	0 0%	6 7%	14 16%	44 48%	26 29%	4	0.848
Civil society demands	90	3 3%	22 24%	32 36%	27 30%	6 7%	3.12	0.97
Personal opinion	90	10 12%	40 44%	20 22%	16 18%	4 4%	2.6	1.047
DHS	86	0 0%	5 6%	16 19%	44 51%	21 24%	3.94	0.817
Cost implications	87	4 5%	7 8%	13 15%	42 48%	21 24%	3.79	1.047
Supervisor's directives	88	4 5%	22 25%	25 28%	29 33%	8 9%	3.17	1.053
Comparing information with strategic objectives	90	0 0%	2 2%	12 13%	51 57%	25 28%	4.1	0.704

Results indicate that 88(98%) of healthcare managers agreed that their decision making in health systems was based on evidence/facts, while 86(96%) based their decision making on health needs. 70(77%) of the managers made decisions based on community



demands while 65(75%) based their decisions on data from DHS. 63(72%) Of the managers made their decisions based on cost implications while 76(85%) based their decision by comparing information with strategic objectives. This means healthcare managers in Mombasa County made their decisions based on other factors other than data from RHIS. This concurs with Nyamtema, (2010), that important health decisions depend on disease estimates and burden, besides data from inconsistently repeated national studies like Demographic Health Survey (DHS) which are not sensitive to changes occurring abruptly. The findings are however, contrary to those of Shiferaw et al., (2017), that decision making in health depended on reliable data as well as human and financial resources which had been invested to improve HIS.

Results also indicate that 56(62%) disagreed that their decision making was based on political opinions and 50(56%) disagreed that they made decisions based on personal opinions. The results imply that political opinions as well as personal opinions do not influence their decision making in managing the health systems. This is contrary to assertions by Nyamtema, (2010), that political opportunism influences decision making in health. However, managers' opinions were divided that their decision making was based on donor demands, civil society demands and supervisors' directives.

#### **4.6.3. Drivers of Health Information Utilization in Making Decision**

Healthcare managers were asked to indicate what motivates/drives them to utilize health Information in making decisions. The results are shown in Table 4.14.

**Table 4.13:*****Drivers for Health Information Utilization in Making Decision***

	<b>n</b>	<b>Frequency</b>	<b>%</b>
Information is key in decision making	90	86	96%
Confidence to use the generated information	90	60	67%
Staff competency on health information utilization	90	55	61%
Positive perception on data collection and use	90	68	76%
Incentives for information utilization	90	25	28%
Having information that adds value to my work	90	68	76%
Adequate and appropriate resources on HIS	90	46	51%
Management guidance and leadership	90	62	69%

Results indicate that 86(96%) of healthcare managers were motivated by information being key in decision making, 68(76%) were motivated by positive attitude towards data collection and use, and 68(76%) were driven by having information that adds value to their work. The results also indicate that 62(69%) of the managers were driven by management guidance and leadership, 60(67%) were motivated by confidence to use the generated information, while 55(61%) noted staff competency on health information utilization as their motivating factor. Additionally, 46(51%) were motivated by adequate and appropriate resources on HIS while 25(28%) were driven by incentives on information use. The results show that 65(72%) of the healthcare managers in Mombasa County were motivated to utilize health information in their decision making by all the factors listed above except 25(28%) who were motivated by incentives.

#### **4.6.4. Relationship between Factors related to Behavior and Health Information Utilization in Making Decision**

Linear regression analysis to assess the degree of influence of perceptions and motivational factors towards HIS use on health information utilization in making

decisions among healthcare managers in Mombasa County was conducted. Results were also used to determine the inclusion of behavior factors as independent variable in the multiple regression analysis at a  $p < 0.2$  level of significance. Results are shown in Tables 4.15, 4.16 and 4.17.

**Table 4.14:**

***Regression Model Summary of Factors related to Behavior on Health Information Utilization in Decision Making***

<b>Model</b>	<b>R</b>	<b>R Square</b>	<b>Adjusted R Square</b>	<b>Std. Error of the Estimate</b>
1	.317 <sup>a</sup>	.100	.079	.367

a. Predictors: (Constant), Perceptions towards HIS use, Motivations on HIS use)

The results ( $R^2 = 0.100$ ) in Table 4.15 indicate that approximately 10% of the variation in health information utilization in making decisions among healthcare managers in Mombasa County was explained by changes in behavior factors (perceptions and motivational factors towards HIS use).

**Table 4.15:**

***ANOVA of Factors related to Behavior on Health Information Utilization in Making Decision***

<b>Model</b>	<b>Sum of Squares</b>	<b>df</b>	<b>Mean Square</b>	<b>F</b>	<b>Sig.</b>
1 Regression	1.289	2	.645	4.795	.011 <sup>b</sup>
Residual	11.562	86	.134		
Total	12.852	88			

a. Dependent Variable: Health Information utilization in making decision

b. Predictors: (Constant), Perceptions towards HIS use, Motivations on HIS use

Results of the ANOVA test ( $F[2, 86] = 4.795, p < .05$ ) in table 4.16 indicate that, at 95% confidence level, the regression model (perceptions and motivational factors towards HIS use) was significant in predicting health information utilization in making decisions among healthcare managers in Mombasa County.

**Table 4.16:**

*Coefficients of Factors related to Behavior on Health Information Utilization in Making Decision*

Model	Unstandardized Coefficients		Standardized Coefficients Beta	t	Sig.
	B	Std. Error			
1 (Constant)	2.227	.326		6.825	.000
Perceptions towards HIS use	.111	.049	.232	2.269	.026
Motivations towards HIS use	.148	.071	.214	2.093	.039

a. Dependent Variable: Health Information utilization in making decision

The regression coefficients shown in Table 4.17 indicate that, at  $p < 0.2$ , perceptions towards HIS ( $\beta_1 = 0.111; t = 2.269; p < 0.05$ ) and motivations towards HIS ( $\beta_2 = 0.148; t = 2.093; p < 0.05$ ) had significant positive influence on health information utilization in making decisions among healthcare managers in Mombasa County (when interaction of the other independent variables is not controlled). This implies that promoting positive perceptions towards HIS use and increasing motivational factors towards HIS use would contribute to increased health information utilization in making decision among healthcare managers in Mombasa County.

These results support sentiments by Aqil et al., (2009), which stated that behavioral determinants gave an insight as to whether or not managers and health workers would utilize health information in making decisions. According to Chaled et al., (2013), what an individual think about the use or effects of a duty and how complex that duty seems to be can affect the duty that is supposed to be performed.

#### **4.7. Factors related to Data Quality which influence Health Information**

##### **Utilization in Making Decision**

Fourth objective was to explore factors related to data quality which influence health information utilization in making decisions among healthcare managers in Mombasa County. The quality data factors considered in this study included data accuracy, completeness and data timeliness.

##### **4.7.1. Sources of Data**

Healthcare managers were asked to indicate their sources of data. Responses are shown in Table 4.18 below.

**Table 4.17:**

##### *Sources of Data*

	<b>n</b>	<b>Frequency</b>	<b>%</b>
Myself	90	59	66%
HRIOs at the facilities	90	44	49%
DHIS	90	28	31%
Journals/Publications	90	1	1%
Students/Interns at the facilities	90	12	13%
Healthcare professionals	90	62	69%
Support staff at the facilities	90	28	31%

Results indicate that 62(69%) of the healthcare managers indicated that data was generated by healthcare professionals, while 59(66%) generated the data themselves. The results also indicate that 44(49%) received data from HRIOs at the facilities, 28(31%) received from DHIS, 28(31%) received from the support staff at the facilities, 12(13%) received from students/interns at the facilities, while 1(1%) obtained data from journals/publications.

The results show that data was generated by healthcare professionals 62(69%). This concurs with MOMS and MOPHS, (2010), that data were collected at the facilities by healthcare professionals then sent to higher levels of the health system. Even findings by WHO, (2014), established that data was collected by healthcare providers and this caused burn-outs among the healthcare providers and data collectors leading to a compromised quality of healthcare and limited ability to attain health goals. The same sentiments were echoed by Gopalan *et al.*, (2013), that data was collected by healthcare providers who already had other tasks to perform and they considered this as extra work which prevented them from their primary professional duty.

#### **4.7.2. Types of Generated Data**

Healthcare managers were asked to show types of generated data in the course of their daily activities. Table 4.19 shows their response.

**Table 4.18:*****Types of Generated Data***

	<b>n</b>	<b>Frequency</b>	<b>%</b>
Outpatient data	90	64	71%
Inpatient data	90	19	21%
Clinical cases data	90	32	36%
Diagnostic data	90	41	46%
Program data (e.g. Malaria, HIV/AIDS, TB)	90	63	70%
Health systems data (finances, infrastructure, human resource)	90	33	37%

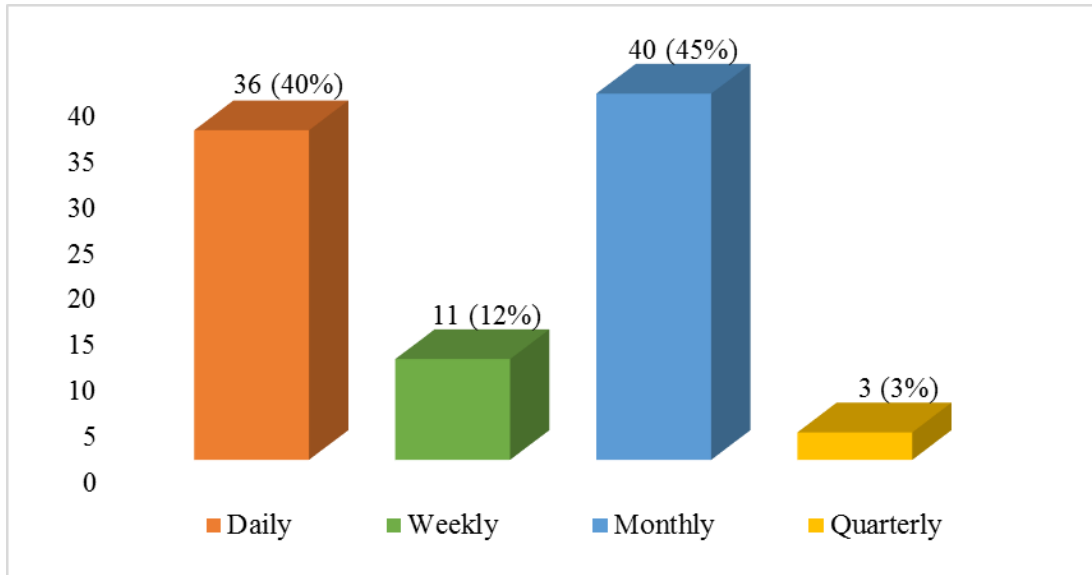
Results indicate that 64(71%) of the healthcare managers generated outpatient data, 63(70%) generated program data (e.g. malaria, HIV/AIDS, TB), 41(46%) generated diagnostic data, 33(37%) generated health systems data, 32(36%) generated clinical cases data, while 19(21%) generated inpatient data in the course of their daily activities. The results indicate the types of data being generated at the facilities majority, 64(71%), being outpatient data.

**4.7.3. Frequency of Data Generation**

The healthcare managers were also required to indicate how often they received data from the sources mentioned above. Figure 4.8 shows the responses.

**Figure 4.8:**

*Frequency of Data Generation*



Results indicate that a higher proportion, 40(45%), of the healthcare managers received data on a monthly basis, 36(40%) received data daily, 11(12%) received data on a weekly basis, while 3(3%) received data on quarterly basis.

**4.7.4. Factors Related to Data Quality**

Healthcare managers were required to respond to statements concerning factors related to data quality. The managers' responses were rated on a five-point Likert scale; where 1 depicts Strongly Disagree (SD), 2 depicts Disagree (D), 3 depicts Neutral (N), 4 depicts Agree (A) and 5 depicts Strongly Agree (SA). Frequencies/percentages of the responses were obtained and average and standard deviation calculated to rate their views.



The scale had a width of 0.8  $[(5-1) \div 5]$ , therefore, a score between 1 to 1.8 depicted Strongly Disagree, between 1.81 to 2.6 Disagree, between 2.61 to 3.4 Neutral, between 3.41 to 4.2 Agree, and between 4.21 to 5 Strongly Agree. Table 4.20 shows the results.

**Table 4.19:**

***Factors Related to Quality Data which Influence Health Information Utilization in Making Decision***

	N	SD	D	N	A	SA	Mean	Std. Dev.
Data is generated by skilled professionals	86	10 11%	23 27%	17 20%	29 34%	7 8%	3.00	1.188
Data is generated using standard tools	90	2 2%	5 6%	4 4%	59 66%	20 22%	4.00	0.835
The generated data is always available for use	88	6 7%	9 10%	18 20%	45 51%	10 12%	3.5	1.05
There is assured privacy of the generated data	88	5 6%	8 9%	33 38%	32 36%	10 11%	3.39	0.999
There are incentives given to data collectors	88	35 40%	35 40%	15 17%	3 3%	0 0%	1.84	0.829

Results indicate that 79(88%) of healthcare managers agreed that data was generated using standard tools while 55(63%) of the managers agreed that the generated data was always available for use. This means that healthcare managers in Mombasa County were using standardized data collection tools. This is contrary to Aqil et al., (2009), that performance of HIS was affected negatively by unstandardized data collection tools. At the same time the results indicate that data was always available for use. This is contrary to findings by Kawila and Odhiambo-Otieno, (2019), that healthcare workers were

unable to access information or reports from the sub-county in time and that information for returning patients was not easily accessible to all service providers simultaneously. However, the managers' opinions were divided that data was generated by skilled HIS professionals and that there was assured privacy of the generated data. Majority, 70(80%), of the managers disagreed that there were incentives given to data collectors. This means that there were no measures in place to motivate those who collected data. This concurs with Aqil et al., (2009), that lack of incentives towards data collection affected HIS performance. This implies that data collectors needed to be given incentives as a way of motivating them. Just as Omole, (2015), pointed out, if motivational measures concerning data management were not addressed, there would be a negative impact on data quality thus causing major problems to healthcare organizations.

#### **4.7.5. Data Accuracy**

Healthcare managers were required to respond to statements concerning data accuracy. The managers' responses were rated on a five-point Likert scale; where 1 depicts Strongly Disagree (SD), 2 depicts Disagree (D), 3 depicts Neutral (N), 4 depicts Agree (A) and 5 depicts Strongly Agree (SA). Frequencies/percentages of the responses were obtained and mean and standard deviation calculated to rate their views.

The scale had a width of 0.8  $[(5-1) \div 5]$ , therefore, a score between 1 to 1.8 depicted Strongly Disagree, between 1.81 to 2.6 Disagree, between 2.61 to 3.4 Neutral, between 3.41 to 4.2 Agree, and between 4.21 to 5 Strongly Agree. Table 4.21 shows the results.

**Table 4.21:***Data Accuracy*

	<b>N</b>	<b>SD</b>	<b>D</b>	<b>N</b>	<b>A</b>	<b>SA</b>	<b>Mean</b>	<b>Std. Dev.</b>
Inaccurate data hinders me from routinely using health information to make decisions	89	6 7%	12 13%	9 10%	36 40%	26 30%	3.72	1.215
As a manager I have come across inaccurate data during decision making process	89	4 5%	12 13%	10 11%	50 56%	13 15%	3.63	1.038
I use all the information I receive to make my decisions regardless of their level of accuracy	88	10 11%	35 40%	24 27%	19 22%	0 0%	2.59	0.955
I have used/relied on other data sources other than RHIS to make decisions	87	4 5%	17 20%	25 28%	36 41%	5 6%	3.24	0.988

Results indicate that 62(70%) of the healthcare managers agreed that inaccurate data hindered them from routinely using health information to make their decisions. 63(71%) of the managers agreed that they had encountered inaccurate data during the decision-making process. This means there were reported cases of inaccurate data received by the managers. These results concur with Njoka, (2015), who established that 89.7% of the respondents in his study agreed that they had encountered inaccurate data during the decision-making process. This also supports findings by the MOH, (2014), that accuracy of summary data and DHIS data was generally low compared to the source documents. This was aggravated by several systemic issues. According to

MOH, (2014), there was only a slight improvement in accuracy of DHIS data against summary sheets despite having qualified HRIOs keying in this data.

Results also indicate that 45(51%) of the managers disagreed that they used all the information they received to make their decisions regardless of their level of accuracy. This implies that data was never used the way it was until inaccuracy issues were addressed. Just as MEASURE-Evaluation PIMA, (2017), pointed out, thorough and regular data review could address data accuracy issues. However, the managers' opinions were divided that they had used/relied on other data sources other than RHIS to make decisions.

#### **4.7.6. Complete Data**

Healthcare managers were required to respond to statements related to completeness of data. The managers' responses were rated on a five-point Likert scale; where 1 depicts Strongly Disagree (SD), 2 depicts Disagree (D), 3 depicts Neutral (N), 4 depicts Agree (A) and 5 depicts Strongly Agree (SA). Frequencies/percentages of the responses were obtained and average and standard deviation calculated to rate their views.

The scale had a width of 0.8  $[(5-1) \div 5]$ , therefore, a score between 1 to 1.8 depicted Strongly Disagree, between 1.81 to 2.6 Disagree, between 2.61 to 3.4 Neutral, between 3.41 to 4.2 Agree, and between 4.21 to 5 Strongly Agree. Table 4.22 shows the results.

**Table 4.20:*****Complete Data***

	<b>N</b>	<b>SD</b>	<b>D</b>	<b>N</b>	<b>A</b>	<b>SA</b>	<b>Mean</b>	<b>Std. Dev.</b>
Reported data sufficiently covers all my health information needs for decision making	89	0 0%	25 28%	25 28%	31 35%	8 9%	3.25	0.969
The reported data includes all the necessary dataset reports	88	4 5%	14 16%	24 27%	38 43%	8 9%	3.36	1.008
The reported data summarizes the work of all the departments	88	1 1%	15 17%	15 17%	45 51%	12 14%	3.59	0.967
The data/information I receive add no value to my decision making due to inconsistencies	87	33 38%	40 46%	8 9%	4 5%	2 2%	1.87	0.925

Results indicate that 57(65%) of healthcare managers agreed that reported data summarized the work of all the departments. This means that all departments generated and compiled their data which was submitted to a central point where the whole facility data was compiled before being disseminated to other levels. However, the managers had varied opinions that the reported data sufficiently covered all their health information needs for decision making and that the reported data included all the necessary dataset reports.

This means that an almost equal number of managers agreed that they got incomplete data. Data is considered complete if it contains all the required data sets with regards to the proportion of reporting facilities in a county or sub-county (Aqil & Lippeveld, 2013). The study results concur with Mate et al., (2009), that several studies conducted

in Africa pointed to the fact that data completeness was a serious concern and only 50.3% of the cases reported complete data.

The results also indicate that 73(84%) of the managers disagreed that the data/information they received added no value to their decision making due to inconsistencies. This implies that the managers considered health data as important for their decision making and that there was value in data that was complete. Data is considered complete and is valuable if it contains all the required data sets with regards to the proportion of reporting departments within a facility or facilities in a county or sub-county (Aqil & Lippeveld, 2013).

#### **4.7.7 Data Timeliness**

The healthcare managers were required to respond to statements related to timeliness of data. The managers' responses were rated on a five-point Likert scale; where 1 depicts Strongly Disagree (SD), 2 depicts Disagree (D), 3 depicts Neutral (N), 4 depicts Agree (A) and 5 depicts Strongly Agree (SA). Frequencies/percentages of the responses were obtained and average and standard deviation calculated rated their views.

The scale had a width of 0.8  $[(5-1) \div 5]$ , therefore, a score between 1 to 1.8 depicted Strongly Disagree, between 1.81 to 2.6 Disagree, between 2.61 to 3.4 Neutral, between 3.41 to 4.2 Agree, and between 4.21 to 5 Strongly Agree. Table 4.23 shows the results.

**Table 4.21:*****Data Timeliness***

	N	SD	D	N	A	SA	Mean	Std. Dev.
Data reporting from various levels of health systems is always comply with the set national reporting timelines	88	2 3%	18 20%	14 16%	36 41%	18 20%	3.57	1.102
Data is always available in time for decision making	90	3 3%	21 23%	20 22%	32 36%	14 16%	3.37	1.106
Measures are always taken within reasonable time to address data reporting issues	87	5 6%	8 9%	20 23%	40 46%	14 16%	3.57	1.052

Results indicate that 54(61%) of the healthcare managers agreed that data reporting from various levels of health systems was always according to the set national reporting timelines and 54(62%) agreed that measures were always taken within reasonable time to address data reporting issues. 46(52%) of the managers also agreed that data was always available in time for decision making. This means that data was always submitted to various levels in time as stipulated in the national guidelines. Similar results were obtained by Njoka, (2015), where 86.2% of the respondents agreed that data reporting from facilities was always in time.

#### **4.7.8. Relationship between Factors Related to Data Quality and Health Information Utilization in Making Decision**

Linear regression was conducted to assess the influence of data accuracy, completeness and data timeliness on health information utilization in making decisions among

healthcare managers in Mombasa County. The results were also used to determine the inclusion of data quality factors in a multiple regression analysis at a  $p < 0.2$  level of significance. Tables 4.24, 4.25 and 4.26 show the results.

**Table 4.22:**

***Regression Model Summary of Factors Related to Data Quality on Health Information Utilization in Making Decision***

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.601 <sup>a</sup>	.362	.339	.314

a. Predictors: (Constant), Data Accuracy, Completeness of Data, Data Timeliness

Results ( $R^2 = 0.362$ ) in Table 4.24 indicate that approximately 36.2% of the variation in health information utilization in making decisions among healthcare managers in Mombasa County was explained by changes in data quality factors (data accuracy, completeness of data and data timeliness).

**Table 4.23:**

***ANOVA of Factors Related to Quality Data on Health Information Utilization in Making Decision***

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	4.791	3	1.597	16.247	.000 <sup>b</sup>
Residual	8.453	86	.098		
Total	13.244	89			

a. Dependent Variable: Health Information utilization in making decision

b. Predictors: (Constant), Data Accuracy, Completeness of Data, Data Timeliness

Results of ANOVA test ( $F[3, 86] = 16.247, p < .01$ ) in table 4.25 indicate that, at 95% confidence level, the regression model (data accuracy, completeness of data and data



timeliness) was significant in predicting health information utilization in making decisions among healthcare managers in Mombasa County.

**Table 4.24:**

***Coefficient of Factors Related to Data Quality on Health Information Utilization in Making Decision***

Model	Unstandardized Coefficients		Standardized Coefficients Beta	t	Sig.
	B	Std. Error			
1 (Constant)	1.656	.257		6.445	.000
Accuracy of Data	.080	.048	.146	1.686	.096
Completeness of Data	.268	.061	.417	4.378	.000
Timeliness of Data	.163	.054	.286	3.010	.003

a. Dependent Variable: Health Information utilization in making decision

Regression coefficients shown in Table 4.26 indicate that, at  $p < 0.2$ , data accuracy ( $\beta_1 = 0.080$ ;  $t = 1.386$ ;  $p < 0.1$ ), completeness of data ( $\beta_2 = 0.268$ ;  $t = 4.378$ ;  $p < 0.01$ ) and data timeliness ( $\beta_3 = 0.163$ ;  $t = 3.010$ ;  $p < 0.01$ ) had significant positive influence on health information utilization in making decision among healthcare managers in Mombasa County (when interaction of the other independent variables is not controlled). This implies that improving the quality of health information through increased data accuracy, completeness and data timeliness would contribute to increased health information utilization in making decisions among healthcare managers in Mombasa County.

These results support Teklegiorgis et al., (2016), who reiterated that managers made accurate decisions when relevant, accurate and timely data was availed to them, and the

opposite is true with irrelevant information which impacted negatively on an organization's performance. This means that data that is accurate, complete and available in time is essential in making decision and other managerial activities. Quality data is, therefore, important in ensuring that health status is accurately described and at the same time exuding confidence in data use among healthcare managers (Teklegiorgis et al., 2016). According to Teklegiorgis et al., (2016), more people valued and relied on data that was of assured quality in order to make decision which eventually improved the overall performance of health system. That is why Nutley and Reynolds, (2013), noted that quality data was the foundation of health systems.

#### **4.8. Determinants of Health Information Utilization in Making Decision**

Analysis by Product moment correlation as well as multiple regressions was performed to determine whether or not technical factors, organizational factors, behavior factors and data quality factors were significant determinants of health information utilization in making decisions among healthcare managers in Mombasa County. Sub-sections below show the results.

##### **4.8.1. Product Moment Correlation**

Pearson's correlation test at a  $p < 0.05$  level of significance was performed to determine the relationship nature between health information utilization in making decisions among healthcare managers in Mombasa County and the independent variables including technical factors, organizational factors, behavior factors and data quality factors. Table 4.27 presents Pearson's product moment correlation test results (Where: Y represents health information utilization in making decisions among healthcare managers in Mombasa County;  $X_1$  represents technical factors;  $X_2$  represents

organizational factors; X<sub>3</sub> represents behavioral factors; and X<sub>4</sub> represents data quality factors).

**Table 4.25:**

***Product Moment Correlation Matrix***

		<b>X<sub>1</sub></b>	<b>X<sub>2</sub></b>	<b>X<sub>3</sub></b>	<b>X<sub>4</sub></b>	<b>Y</b>
<b>X<sub>1</sub></b>	Pearson Correlation	1				
	Sig. (2-tailed)					
	N	90				
<b>X<sub>2</sub></b>	Pearson Correlation	.443**	1			
	Sig. (2-tailed)	.000				
	N	89	89			
<b>X<sub>3</sub></b>	Pearson Correlation	.165	.072	1		
	Sig. (2-tailed)	.122	.508			
	N	89	88	89		
<b>X<sub>4</sub></b>	Pearson Correlation	.242*	.436**	-.052	1	
	Sig. (2-tailed)	.022	.000	.628		
	N	90	89	89	90	
<b>Y</b>	Pearson Correlation	.502**	.660**	-.054	.556**	1
	Sig. (2-tailed)	.000	.000	.612	.000	
	N	90	89	89	90	90

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

\* . Correlation is significant at the 0.05 level (2-tailed).

Results indicate that technical ( $r = 0.502$ ,  $p < 0.01$ ), organizational ( $r = 0.660$ ,  $p < 0.01$ ) and data quality ( $r = .556$ ,  $p < 0.01$ ) had a significant and moderate positive correlation with health information utilization in making decisions among healthcare managers in Mombasa County. Results also indicate that behavior factors ( $r = -0.054$ ,  $p > 0.05$ ) had

no significant correlation with health information utilization in making decisions among healthcare managers in Mombasa County.

#### 4.8.2 Multiple Regressions

Multiple regression analysis was performed to analyze the overall regression model and how well each independent variable predicted health information utilization in making decision among healthcare managers in Mombasa County. Tables 4.28, 4.29 and 4.30 show the results.

**Table 4.26:**

***Regression Model Summary of Cofactors on Health Information Utilization in Making Decision***

<b>Model</b>	<b>R</b>	<b>R Square</b>	<b>Adjusted R Square</b>	<b>Std. Error of the Estimate</b>
1	.765 <sup>a</sup>	.586	.566	.253

a. Predictors: (Constant), Technical Factors, Organizational Factors, Behavioral Factors, Data Quality Factors

The results ( $R^2 = 0.586$ ) in Table 4.28 above indicate that approximately 58.6% of the variation in health information utilization in making decisions among healthcare managers in Mombasa County was explained by changes in technical, organizational, behavior and quality data factors.

**Table 4.27:***ANOVA of Cofactors on Health Information Utilization in Making Decision*

<b>Model</b>	<b>Sum of Squares</b>	<b>Df</b>	<b>Mean Square</b>	<b>F</b>	<b>Sig.</b>
1 Regression	7.502	4	1.876	29.332	.000 <sup>b</sup>
Residual	5.307	83	.064		
Total	12.810	87			

a. Dependent Variable: Health Information utilization in making decision

b. Predictors: (Constant), Technical, Organizational, Behavior, Quality Data

ANOVA test results ( $F[4, 83] = 29.332, p < .01$ ) in table 4.29 above indicate that, at 95% confidence level, the regression model (technical, organizational, behavior and data quality factors) was significant in predicting health information utilization in making decisions among Mombasa County healthcare managers.

**Table 4.28:***Coefficients of Cofactors on Health Information Utilization in Making Decision*

<b>Model</b>	<b>Unstandardized Coefficients</b>		<b>Standardized Coefficients</b>	<b>t</b>	<b>Sig.</b>
	<b>B</b>	<b>Std. Error</b>	<b>Beta</b>		
1 (Constant)	1.392	.284		4.899	.000
Technical Factors	.151	.044	.275	3.428	.001
Organizational Factors	.233	.051	.391	4.552	.000
Behavior Factors	-.094	.061	-.110	-1.527	.130
Data Quality factors	.298	.073	.324	4.079	.000

a. Dependent Variable: Health Information utilization in making decision

Partial regression coefficients shown in Table 4.30 indicate that technical factors is a significant predictor of health information utilization in making decisions among healthcare managers in Mombasa County ( $\beta_1 = 0.151$ ;  $t = 3.428$ ;  $p < 0.01$ ); organizational factors is a significant predictor of health information utilization in making decisions among healthcare managers in Mombasa County ( $\beta_2 = 0.233$ ;  $t = 4.552$ ;  $p < 0.01$ ); behavior factors is not a significant predictor of health information utilization in making decisions among healthcare managers in Mombasa County ( $\beta_3 = -0.094$ ;  $t = -1.527$ ;  $p > 0.05$ ); and data quality factors is a significant predictor of health information utilization in making decisions among healthcare managers in Mombasa County ( $\beta_4 = 0.298$ ;  $t = 4.079$ ;  $p < 0.01$ ).

$$\alpha + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \varepsilon = Y$$

$$1.392 + 0.151X_1 + 0.233X_2 - 0.094X_3 + 0.298X_4 = Y$$

Where:  $\alpha$  represents the regression constant;  $\beta_i$  represent the coefficients of the independent variables;  $X_1$  represents technical factors;  $X_2$  represents organizational factors;  $X_3$  represents behavioral factors;  $X_4$  represents data quality factors;  $\varepsilon$  is the error term and  $Y$  is the dependent variable (health information utilization in making decision among healthcare managers in Mombasa County).

The results imply that when technical factors were improved, organizational factors were improved and factors related to data quality were enhanced then health information utilization in making decisions would also improve. However, factors related to behavior would not have any significant influence on health information utilization in making decisions unless such changes were accompanied with changes on technical, organizational and data quality factors. This finding is contrary to

sentiments by Aqil et al., (2009), that behavioral determinants provided crucial insight on whether or not health information was utilized in a health system. This is also contrary to assertions by Chaled et al., (2013), that what one has in mind concerning a given duty is likely to affect the duty to be performed.

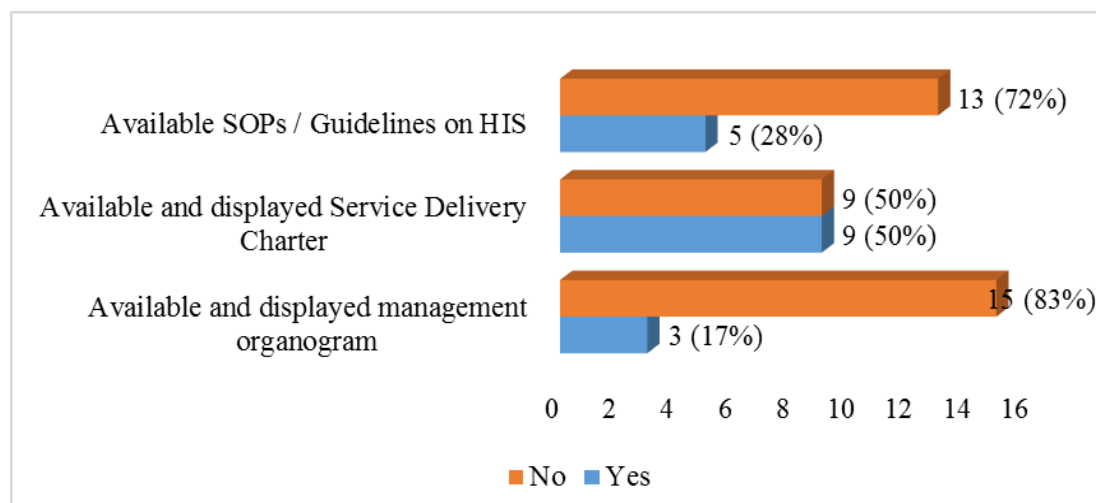
#### 4.9. Health Information Utilization in Making Decision

##### 4.9.1 General Observation of the Health Facilities

Observations were conducted in the county Department of Health (DOH) office, 4 sub county offices and 13 health facilities, a total of 18 areas observed. Results in Figure 4.9 shows that only 3(17%) of the facilities had and displayed management organogram, 9(50%) of the facilities had and displayed service delivery charter, while only 5(28%) of the facilities had SOPs/Guidelines on HIS.

**Figure 4.9:**

*General Observation of the Facilities*



##### 4.9.2. Documents used on HIS

Healthcare managers were asked whether they were in possession of and used certain documents on HIS including guidelines, protocols/SOPs, annual/monthly planned

targets, research publications and reports on success stories. The managers' responses were rated on a five-point Likert scale; where 1 depicts Strongly Disagree (SD), 2 depicts Disagree (D), 3 depicts Neutral (N), 4 depicts Agree (A) and 5 depicts Strongly Agree (SA). Frequencies/percentages of the responses were obtained and average and standard deviation calculated to rate their views.

The scale had a width of 0.8  $[(5-1) \div 5]$ , therefore, a score between 1 to 1.8 depicted Strongly Disagree, between 1.81 to 2.6 Disagree, between 2.61 to 3.4 Neutral, between 3.41 to 4.2 Agree, and between 4.21 to 5 Strongly Agree. Table 4.31 shows the results.

**Table 4.29:**

*Documents used on HIS*

	<b>n</b>	<b>SD</b>	<b>D</b>	<b>N</b>	<b>A</b>	<b>SA</b>	<b>Mean</b>	<b>Std. Dev.</b>
Guidelines	89	4 5%	8 9%	8 9%	41 46%	28 31%	3.91	1.083
Protocols/SOPs	90	1 1%	6 7%	15 17%	42 46%	26 29%	3.96	0.911
Annual/Monthly planned targets	90	2 2%	3 3%	6 7%	52 58%	27 30%	4.1	0.835
Research publications	88	8 9%	27 31%	38 43%	9 10%	6 7%	2.75	0.997
Reports on success stories	86	5 6%	22 25%	31 36%	16 19%	12 14%	3.09	1.113
I know the contents of the above documents that I use	86	4 5%	11 13%	41 47%	24 28%	6 7%	3.2	0.918

Results show that 69(77%) of the healthcare managers agreed that they had and used guidelines, 68(75%) agreed that they had and used protocols/SOPs, and 79(88%) agreed



that they had and used annual/monthly planned targets. This means that healthcare managers in Mombasa County used guidelines and SOPs on HIS as their reference points. This is contrary to findings by the MOH, (2014), that accuracy of summary data and DHIS data was generally low compared to the source documents due to several systemic issues which included lack of lack of SOPs, among others.

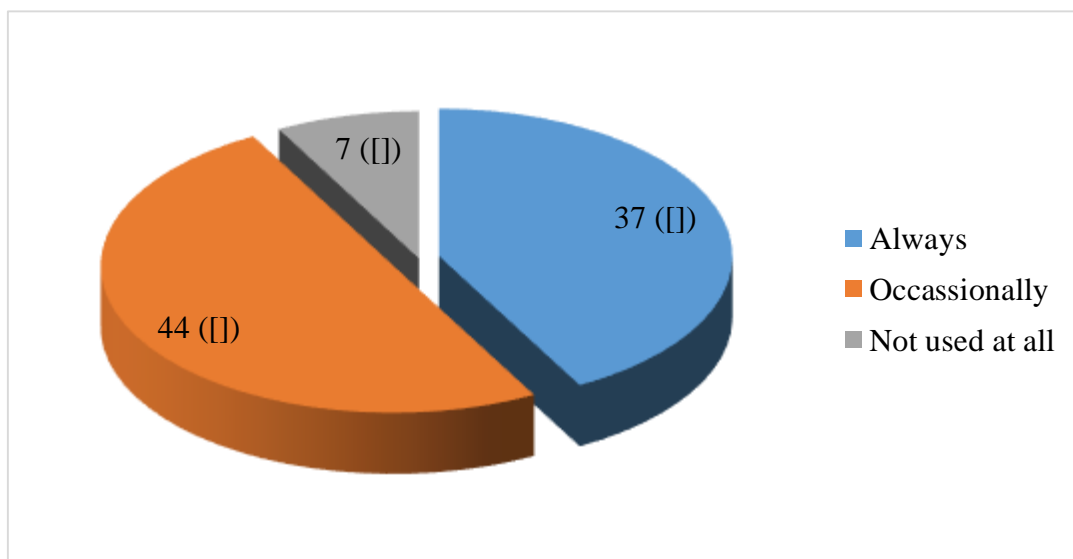
However, a higher proportion, 38(43%) of the managers were neutral that they had and used research publications and 31(36%) were neutral that they had and used reports on success stories. Additionally, the results indicate that a higher proportion, 41(48%) of the respondents were neutral that they knew the contents of the documents they used.

#### 4.9.3. Frequency of using the mentioned documents

Healthcare managers were asked to indicate how often they used the documents/reference materials (mentioned above) on health information in making decisions. Results are shown in Figure 4.10 below.

**Figure 4.10:**

*Frequency of Using Documents on Health Information Utilization in Making Decision*



The results indicate that 44(50%) of the managers occasionally used the documents, 37(42%) of the managers always used the documents while 7(8%) of the managers never used the documents as points of reference in making decisions. Since the majority responded that they occasionally used the documents, this means that the documents did not influence the level of health information utilization in making decisions among the healthcare managers.

#### **4.9.4 Health Information Utilization in Planning**

Healthcare managers were required to respond to statements concerning health information utilization in planning and performing various tasks. The managers' responses were scored on a five-point Likert scale; where 1 depicts Strongly Disagree (SD), 2 depicts Disagree (D), 3 depicts Neutral (N), 4 depicts Agree (A) and 5 depicts Strongly Agree (SA). Frequencies/percentages of the responses were obtained and average and standard deviation calculated to rate their views.

The scale had a width of 0.8  $[(5-1) \div 5]$ , therefore, a score between 1 to 1.8 depicted Strongly Disagree, between 1.81 to 2.6 Disagree, between 2.61 to 3.4 Neutral, between 3.41 to 4.2 Agree, and between 4.21 to 5 Strongly Agree. Table 4.32 shows the results.

**Table 4.30:***Health Information Utilization in Planning*

	<b>n</b>	<b>SD</b>	<b>D</b>	<b>N</b>	<b>A</b>	<b>SA</b>	<b>Mean</b>	<b>Std. Dev.</b>
Formulation of Health Policies	90	0 0%	3 3%	27 30%	40 44%	20 22%	3.86	0.801
Ensure financial allocation/ reallocation based on needs	89	4 4%	8 9%	13 15%	44 49%	20 22%	3.76	1.045
Develop strategies that ensure access to healthcare	87	5 6%	5 6%	19 22%	43 49%	15 17%	3.67	1.019
Develop strategies for managing epidemics	88	5 6%	4 4%	26 30%	35 40%	18 20%	3.65	1.04
Design disease surveillance strategies	89	1 1%	0 0%	21 24%	60 67%	7 8%	3.81	0.619
Conduct health systems researches	89	1 1%	7 8%	69 78%	12 13%	0 0%	3.03	0.51
In recruitment/selection of human resource for health	90	2 2%	6 7%	35 39%	44 49%	3 3%	3.44	0.766
Medical supplies management	90	1 1%	24 27%	56 62%	7 8%	2 2%	2.83	0.675
Conduct training to staff based on their needs	90	0 0%	10 11%	38 42%	40 45%	2 2%	3.38	0.712
Develop and implement staff retention strategies	90	0 0%	5 6%	70 77%	14 16%	1 1%	3.12	0.493
Empower individuals with timely relevant health info	90	0 0%	6 7%	77 85%	7 8%	0 0%	3.01	0.382

Results indicate that 60(66%) of the healthcare managers agreed that health information was used in formulation of health policies. This supports assertions by Abajebel et al., (2011), that healthcare managers should monitor and evaluate measures put in place to formulate and implement policies in order to come up with informed decisions that can achieve set health targets. Results also indicate that 64(71%) agreed that health information utilization ensured financial allocation/reallocation was based on needs while 58(66%) agreed that it was used in developing strategies that ensured access to healthcare services. 53(60%) agreed that health information was used in developing strategies for managing epidemics, 67(75%) agreed that health information was utilized in designing disease surveillance strategies while 47(52%) agreed that it was used in recruitment and selection of human resources for health.

These findings support assertions by Wekesa (2014), where she reiterated that an effective HIS had multiple benefits and enabled healthcare managers to do the following: Detecting and controlling emerging and endemic conditions; monitoring progress towards attainment of health targets; To promote equity in health; To empower individuals and communities with timely dissemination of health information; To enhance quality of services; To strengthen evidence base for formulation of health policies; To enable innovation through research; To improve governance; To mobilize and allocate resources and ensure accountability in resource use. Omole (2015), also reiterated that a key component of HIS was surveillance in public health whose main focus was identifying problems and taking corrective measures promptly, for instance during epidemics.

However, a higher proportion, 70(78%) of the managers were neutral that health information was being used to conduct health systems researches. 56(62%) were neutral

that it was used in management of medical supplies. 70(78%) were neutral that health information was used in developing and implementing staff retention strategies and 77(85%) were neutral that it was used to empower individuals with timely relevant health information (86%). However, the managers had varied opinions that health information was used in conducting training to staff based on their training needs.

Additionally, information gathered from the 18 facilities through observation indicated that 15(83%) of the facilities had records of the number of staff employed/redeployed in that quarter, 17(94%) had records of the staffing levels against workload, 18(100%) had records of medical commodities in stock against consumption levels and record of the medical supplies from KEMSA against orders made for the commodities. 16(89%) of the facilities had records of the strategies to ensure access to health services by all patients, 18(100%) had raw data, 16(89%) had analyzed data while 13(72%) had functional computer systems.

However, all the facilities did not have a record of resources allocated for health systems research. The results also indicated that 10(56%) of the facilities did not have records of financial allocation to HIS, 12(67%) did not have records of resources allocated for disease surveillance, 15 (83%) did not have records of policies formulated based on the Health Information provided, 14(78%) did not have records of the number of staffs trained on HIS, 17(94%) did not have records of the number of staff sensitized on Health Information utilization for decision making.

Based on the above findings, there was utilization of health information in making decisions among healthcare managers in Mombasa County only to a certain extent. These results support sentiments expressed by Kenya Coordinating Mechanism, (2015), which stated that there was underutilization of health information for decision

making in Mombasa County and this had resulted in lack of efficiency and effectiveness in provision of healthcare services. Table 4.33 shows the results.

**Table 4.31:**

***Demand for Health Information during Making Decision***

	n	Yes		No	
		Fre q	%	Fre q	%
Available file with record of the number of healthcare professionals employed in the current financial year	18	15	83%	3	17%
Available file with record of the number of healthcare professionals redeployed in the current financial year based on service needs	18	15	83%	3	17%
Available file with record of the staffing level against the workload	18	17	94%	1	6%
Available file with record of financial allocation to HIS	18	8	44%	10	56%
Available file with record of the medical commodities in stock against the consumption levels	18	18	100%	0	0%
Available file with record of the medical supplies from KEMSA against the orders made for the commodities	18	18	100%	0	0%
Available file with record of resources allocated for health systems research	18	0	0%	18	100%
Available file with record of resources allocated for disease surveillance	18	6	33%	12	67%
Available record of policies formulated based on the Health Information provided	18	3	17%	15	83%
Available record of strategies put in place to ensure access to healthcare services by all patients	18	16	89%	2	11%
Available file with record of the number of staffs trained on HIS	18	4	22%	14	78%
Available file with record of number of staff sensitized on health info utilization for decision making	18	1	6%	17	94%
Available raw data	18	18	100%	0	0%
Available analyzed data	18	16	89%	2	11%
Available info in the form of charts, graphs, tables etc.	18	16	89%	2	11%
Available functional computer systems	18	13	72%	5	28%

#### 4.9.5 Health Information utilization in Monitoring and Evaluation of Health System's Performance

Healthcare managers were required to respond to statements concerning health information utilization in monitoring and evaluating the health system's performance. The managers' responses were scored on a five-point Likert scale; where 1 depicts Strongly Disagree (SD), 2 depicts Disagree (D), 3 depicts Neutral (N), 4 depicts Agree (A) and 5 depicts Strongly Agree (SA). Frequencies/percentages of the responses were obtained and average and standard deviation calculated to rate their views.

The scale had a width of 0.8  $[(5-1) \div 5]$ , therefore, a score between 1 to 1.8 depicted Strongly Disagree, between 1.81 to 2.6 Disagree, between 2.61 to 3.4 Neutral, between 3.41 to 4.2 Agree, and between 4.21 to 5 Strongly Agree. Table 4.34 shows the results.

**Table 4.32:**

#### *Health Information Utilization in Monitoring and Evaluation*

	N	S D	D	N	A	SA	Mea n	Std. Dev
Assess staffs' technical competency on HIS	87	4 5 %	14 16%	24 27%	32 37 %	13 15%	3.41	1.073
To assess staffs' performance on health service delivery	88	4 5 %	7 8%	19 21%	47 53 %	11 13%	3.61	0.964
To ensure health facilities' performance is based on health information	85	1 1 %	7 8%	20 24%	44 52 %	13 15%	3.72	0.868
To ensure patients' management is based on health information	90	5 6 %	21 23%	32 36%	29 32 %	3 3%	3.04	0.959
To ensure resource allocation/reallocation is based on health information	88	3 3 %	4 5%	44 50%	32 36 %	5 6%	3.36	0.805
To share best practices on the overall health systems performance	90	3 3 %	10 11%	45 50%	31 35 %	1 1%	3.19	0.777

Results indicate that 45(52%) of healthcare managers agreed that they used health information to assess staffs’ technical competency on HIS. 58(66%) agreed that they assessed staffs’ performance on health service delivery and 57(67%) agreed that they utilized health information to ensure health facilities’ performance was based on health information. However, 32(36%) of the managers were neutral that they used health information to ensure patients’ management was based on health information. 44(50%) of the managers were neutral in that they utilized health information to ensure resource allocation/reallocation was based on health information. 45(50%) of the managers were also neutral that they utilized health information to ensure there was sharing of best practices on the overall health systems performance.

Additionally, data obtained from the 18 facilities through observation indicated that the majority of the facilities had records of the M&E conducted in that quarter, minutes of meetings held during M&E, M&E checklist, and M&E reports. Table 4.35 shows the results.

**Table 4.35:**

***Monitoring and Evaluation of Health System’s Performance***

	<b>n</b>	<b>Yes</b>		<b>No</b>	
		<b>Frequency</b>	<b>%</b>	<b>Frequency</b>	<b>%</b>
Available file with record of the Monitoring and Evaluation conducted in the current quarter	18	15	83%	3	17%
Available minutes of meetings held during Monitoring and Evaluation	18	15	83%	3	17%
Available checklist for Monitoring and Evaluation	18	15	83%	3	17%
Available reports on Monitoring and Evaluation done	18	15	83%	3	17%



These results imply that monitoring and evaluation of health systems' performance was being carried out. These findings concur with Health Sector M&E Framework developed by the MOH to guide counties in developing their own HIS M&E plans and strategic guidelines (MOH, 2014). However, what monitoring and evaluation entailed was not clear to all the healthcare managers. The M&E Framework outlines several reports and the data that should be presented in those reports, including the Annual Health Sector Performance Report (2013–2014), a report compiled and disseminated by the Division of Health Informatics and M&E that provides health outcomes data, achievements against different health goals, and funding allocations for the previous year (MOH, 2014).

#### **4.9.6 Consequences of Health Information Utilization in Making Decisions**

Healthcare managers were asked to respond to statements concerning the consequences of health information utilization in making decisions. The managers' responses were scored on a five-point Likert scale; where 1 depicts Strongly Disagree (SD), 2 depicts Disagree (D), 3 depicts Neutral (N), 4 depicts Agree (A) and 5 depicts Strongly Agree (SA). Frequencies/percentages of the responses were obtained and average and standard deviation calculated to rate their views.

The scale had a width of 0.8  $[(5-1) \div 5]$ , therefore, a score between 1 to 1.8 depicted Strongly Disagree, between 1.81 to 2.6 Disagree, between 2.61 to 3.4 Neutral, between 3.41 to 4.2 Agree, and between 4.21 to 5 Strongly Agree. Table 4.36 shows the results.

**Table 4.36:***Consequences for Health Information Utilization in Making Decisions*

	<b>N</b>	<b>SD</b>	<b>D</b>	<b>N</b>	<b>A</b>	<b>SA</b>	<b>Mean</b>	<b>Std. Dev.</b>
Adequate professional staffs have been employed in this current financial year	89	1 1%	21 24%	49 55%	18 20%	0 0%	2.94	0.697
Professional staffs have been redeployed to various work stations based on service needs in this current financial year	90	13 14%	20 22%	18 20%	34 38%	5 6%	2.98	1.190
There are adequate staffing levels across all cadres under my area of jurisdiction	87	29 33%	38 44%	11 13%	7 8%	2 2%	2.02	1.000
The percentage of financial allocation to various healthcare activities is adequate	89	25 28%	39 44%	17 19%	8 9%	0 0%	2.09	0.913
There are adequate medical supplies thus no stock-outs experienced	90	8 9%	17 19%	18 20%	26 29%	21 23%	3.39	1.278
There are adequate resources allocated for conducting health systems research	90	27	32	11	18	2	2.29	1.164
There are adequate resources allocated for disease surveillance activities	88	27 31%	23 26%	22 25%	10 11%	6 7%	2.38	1.225
There is policy formulation based on the health information provided	90	1 1%	2 2%	30 33%	38 43%	19 21%	3.8	0.837
There are strategies developed to ensure access to healthcare services by all patients	90	0 0%	3 3%	28 31%	45 50%	14 16%	3.78	0.746

Results indicate that 57(64%) of the healthcare managers agreed that health information utilization in making decisions ensured that there was policy formulation based on the health information provided. 59(66%) of the managers agreed that health information utilization ensured there were strategies developed to ensure access to healthcare services by all patients. However, 67(77%) of the managers disagreed that utilization of health information ensured that there were adequate staffing levels across all cadres. 64(72%) of the managers disagreed that the percentage of financial allocation to various healthcare activities was adequate. 59(66%) of the managers disagreed that there were adequate resources allocated for conducting health systems research.

Results also indicate that 50(57%) of the managers disagreed that there were adequate resources allocated for disease surveillance activities. In addition, the results indicated that 49(56%) of the managers were neutral that health information utilization ensured that adequate professional staff had been employed. The managers' responses were widely varied that professional staff had been redeployed to various work stations based on service needs. The managers' responses were also varied that there were adequate medical supplies thus no stock-outs experienced.

These results imply that healthcare managers in Mombasa County utilize health information in making decisions only to a certain extent. This means that health information was underutilized in making decisions. This concurs with assertions by Kenya Coordinating Mechanism, (2015), that there was underutilization of health information for decision making in Mombasa County. Even at Coast General Teaching and Referral Hospital (CGTRH), demand for use of available information generated by health workers and managers in making decisions were at a minimum level (Nzomo,

2017). Similar sentiments were expressed by WHO (2014) that healthcare providers in various healthcare organizations, globally, could not identify problems and prioritize needs, neither could they monitor and evaluate the impact of interventions they put in place. This was due to underutilization of health information to make their decisions.

#### **4.9.7 Challenges Experienced in Health Information Utilization in Making Decisions**

Healthcare managers were asked to write the challenges they experienced in health information utilization in making decisions. The challenges that were listed included inadequate funding/resources 27(30%), lack of trained data collection clerks 23(26%), inadequate staff/heavy workload 22(24%), inadequate/lack of maintenance of computers/software 22(24%), lack of knowledge on HIS 21(23%), lack of incentives/motivation 21(23%), poor data quality(incomplete data) 19(21%), poor attitude towards HIS (21%), inadequate data collection/management tools 17(19%), among others. Table 4.37 presents the results.

**Table 4.37:*****Challenges in Health Information Utilization in Making Decisions***

<b>Challenges</b>	<b>n</b>	<b>Frequency</b>	<b>%</b>
Inadequate computers/software/lack of maintenance	90	22	24%
Lack of incentives/motivation	90	21	23%
Inadequate tools for data collection and analysis	90	17	19%
Poor quality data (Incomplete data/delayed reports)	90	19	21%
Recurrent changes in data collection tools	90	13	14%
Lack of trained data collection clerks	90	23	26%
Inadequate funding/resources	90	27	30%
Inadequate staff/heavy workload	90	22	24%
Lack of adherence to rules & regulations	90	8	9%
Poor attitude towards HIS	90	19	21%
Inaccurate health information	90	17	19%
Lack of involvement in policy formulation	90	6	7%
Lack of knowledge on HIS	90	21	23%
Lack of feedback mechanisms	90	7	8%
Poor health information sharing	90	11	12%
Political interference	90	14	16%

## CHAPTER FIVE

### SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

#### 5.1. Summary of findings

The study sought to examine the determinants of health information utilization in making decisions among healthcare managers in Mombasa County so that the recommendations made from the study be used to inform adoption and implementation of measures that would enhance utilization of information in making decisions.

First objective was to assess technical factors which influence health information utilization in making decisions among healthcare managers in Mombasa County. The technical factors considered in the study included availability of skilled management staff on HIS and data collection tools. Regression on technical factors on health information utilization in making decision revealed that, at  $p < 0.2$  level of significance, managers' skills on HIS ( $\beta_1 = 0.095$ ;  $t = 2.134$ ;  $p < 0.05$ ) and available data collection tools ( $\beta_2 = 0.205$ ;  $t = 3.857$ ;  $p < 0.01$ ) had significant positive influence on health information utilization in making decision among healthcare managers in Mombasa County.

Further tests using product moment correlation ( $r = 0.502$ ,  $p < 0.01$ ) and multiple regression analysis ( $\beta_1 = 0.151$ ;  $t = 3.428$ ;  $p < 0.01$ ) indicated that, at a  $P < 0.05$  level of significance, technical factors was significant statistically and had a positive influence on health information utilization in making decision among healthcare managers in Mombasa County, even when other factors in the model were held constant. This implies that improving managers' skills on HIS and ensuring data collection tools were made available would increase health information utilization among healthcare managers in Mombasa County.

Second objective was to examine organizational factors which influence health information utilization in making decisions among healthcare managers in Mombasa County. The organizational factors considered in this study included supportive supervision on HIS, feedback mechanisms on HIS and resources for HIS activities. Regression of organizational factors on health information utilization in making decision revealed that, at  $p < 0.2$  level of significance, feedback mechanisms on HIS ( $\beta_1 = 0.155$ ;  $t = 2.922$ ;  $p < 0.01$ ), supportive supervision on HIS ( $\beta_2 = 0.208$ ;  $t = 3.844$ ;  $p < 0.01$ ) and resources for HIS activities ( $\beta_3 = 0.079$ ;  $t = 2.672$ ;  $p < 0.01$ ) had significant positive influence on health information utilization in making decision among healthcare managers in Mombasa County.

Further tests using product moment correlation ( $r = 0.660$ ,  $p < 0.01$ ) and multiple regression analysis ( $\beta_2 = 0.233$ ;  $t = 4.552$ ;  $p < 0.01$ ) indicated that, at a  $P < 0.05$  level of significance, organizational factors was significant statistically and had a positive influence on health information utilization in making decision among healthcare managers in Mombasa County. This means that when feedback mechanisms were improved, supportive supervision was enhanced and resource availability for HIS activities increased, health information utilization in making decision among healthcare managers in Mombasa County would increase.

Third objective was to investigate factors related to behavior which influence health information utilization in making decisions among healthcare managers in Mombasa County. The behavioral factors considered in this study included perceptions and motivational factors towards HIS use. Regression on factors related to behavior on health information utilization in making decision revealed that, at  $p < 0.2$  level of significance, perceptions towards HIS use ( $\beta_1 = 0.111$ ;  $t = 2.269$ ;  $p < 0.05$ ) and

motivational factors towards HIS use ( $\beta_2 = 0.148$ ;  $t = 2.093$ ;  $p < 0.05$ ) had significant positive influence on health information utilization in making decisions among healthcare managers in Mombasa County.

However, product moment correlation test ( $r = -0.054$ ,  $p > 0.05$ ) and multiple regression analysis ( $\beta_3 = -0.094$ ;  $t = -1.527$ ;  $p > 0.05$ ) indicated that at  $P < 0.05$  level of significance, when other cofactors (technical, organizational and data quality) were controlled/held constant, behavioral factors had no statistical significant influence on health information utilization in making decisions among healthcare managers in Mombasa County. This implies that the influence of behavioral factors (perceptions and motivational factors towards HIS use) on health information utilization in making decisions among healthcare managers in Mombasa County was only significant when behavioral factors interacted with other independent variables.

Fourth objective was to explore factors related to data quality which influence health information utilization in making decisions among healthcare managers in Mombasa County. The data quality factors considered in this study included data accuracy, completeness and data timeliness. Regression of data quality factors on health information utilization in making decisions revealed that, at  $p < 0.2$  level of significance, data accuracy ( $\beta_1 = 0.080$ ;  $t = 1.386$ ;  $p < 0.1$ ), completeness ( $\beta_2 = 0.268$ ;  $t = 4.378$ ;  $p < 0.01$ ) and data timeliness ( $\beta_3 = 0.163$ ;  $t = 3.010$ ;  $p < 0.01$ ) had significant positive influence on health information utilization in making decisions among healthcare managers in Mombasa County (when interaction of other independent variables is not controlled).

Further tests using product moment correlation ( $r = .556$ ,  $p < 0.01$ ) and multiple regression analysis ( $\beta_3 = -0.094$ ;  $t = -1.527$ ;  $p > 0.05$ ) indicated that, at a  $P < 0.05$  level



of significance, data quality factors had statistically significant and positive impact on health information utilization in making decisions among healthcare managers in Mombasa County. This implies that improvements in data accuracy, completeness and data timeliness would lead to increased health information utilization in making decisions among healthcare managers in Mombasa County.

## **5.2. Conclusions**

It is evident from the study that health information utilization in making decisions among healthcare managers in Mombasa County was influenced by technical factors like skills on HIS and data collection tools. Having skills in data gathering, analysis, interpretation and information management means that the managers will understand and effectively and efficiently utilize health information in their managerial duties. Similarly, having adequate data collection tools which are standardized ensures that the data collection process is streamlined and this leads to generation of quality information. Quality data/information is valued and can be easily relied on in making decisions.

Organizational factors like feedback mechanisms on HIS, supportive supervision on HIS and resources for HIS activities influenced health information utilization in making decisions among healthcare managers in Mombasa County. Having feedback mechanisms ensures that the cycle of data reporting is complete. This enables managers to make informed decisions. Carrying out supportive ensures that knowledge on HIS is enhanced and this enables healthcare organizations' goals to be achieved. Availing adequate resources for HIS activities, in terms of human, finance and equipment enhances generation of quality data and information which eventually enhances utilization of health information in making decision.

It is also evident from the study that factors related to behavior like perceptions and motivational factors towards HIS had no significant influence on health information utilization in making decisions among health care managers in Mombasa County. The influence was only significant when these factors interacted with technical, organizational and data quality factors.

Factors related to data quality like accuracy, completeness and timeliness of data influenced health information utilization in making decisions among healthcare managers in Mombasa County. Accurate data measures what it is intended to measure and this minimizes error to a negligible level. Complete data contains all the required data sets with regards to the proportion of reporting departments within a facility or within facilities in a county or sub-county. Timely data is that which is availed to decision makers as stipulated in the national guidelines concerning data reporting timelines. When all these are adhered to then utilization of health information in making decision will be improved.

### **5.3. Recommendations from the Study**

The following recommendations are made based on the study outcome;

- i. Mombasa County Government, through the office of Human Resource Director, should conduct regular training on HMIS to healthcare managers. This will enhance the managers' skills on HIS. This will address the issues of skills gap on HIS and data quality with regards to data accuracy.
- ii. The MOH should put more emphasis on HMIS as a subject in the pre-service training institutions of all healthcare cadres.

- iii. The MOH and Mombasa County Government, through the office of County Chief Officer of health, should allocate more resources for effective implementation of HIS.

#### **5.4. Suggestions for Further Research**

The factors considered in this study (technical, organizational, behavior and data quality factors) have a partial influence (58.6%) on health information utilization in making decisions among healthcare managers in Mombasa County. Therefore, other studies should be carried out to focus on other factors (such as use of IT, managerial/leadership support, external environmental factors, other data quality factors like relevance and validity of data) which influence health information in making decision in order to improve HIS and facilitate proper prioritization of health needs, interventions and proper resource allocation.

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## APPENDICES

### Appendix 1: Map of Mombasa County



## **Appendix 2: Participants Consent Form**

**Dear Respondent,**

My names are Moses Ochieng Otieno. I am a Msc. student at the Kenya Methodist University. I am conducting a study titled: **Determinants of Health Information utilization in making decision among healthcare managers in Mombasa County.** The findings will be utilized to strengthen the health systems in Kenya and other Low-income countries in Africa. As a result, countries, communities and individuals will benefit from improved quality of healthcare services. This research proposal is critical to strengthening health systems as it will generate new knowledge in this area that will inform decision makers to make decisions that are based on research.

### **Procedure to be followed**

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

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

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

### **Discomfort and risks**

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

### **Benefits**

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

knowledge in this area that will inform decision makers to make decisions that are research based.

**Rewards**

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

**Confidentiality**

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

**Contact Information**

If you have any questions you may contact the following supervisors: 1. Ms. Lillian Muiruri 2. Dr. Caroline Kawila and Dr. Keziah, Chair of Department of Health Systems Management of Kenya Methodist University, Nairobi Campus.

**Participant’s Statement**

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

Name of Participant..... Date.....

Signature.....

**Investigator’s Statement**

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

Name of Interviewer..... Date.....

Interviewer’s Signature.....

### Appendix 3: Research Questionnaire

Questionnaire Identification Number.....

#### Section 1: Background Information

Please mark where appropriate using either x,  $\sqrt{\quad}$  or circle in the boxes provided. Your honesty will be highly appreciated.

(1). Which management level do you belong to?

(i). CHMT

(ii). SCHMT

(iii). Facility In-Charge

(iv). HOD

(2) How old are you?  
.....

(3) Sex

Male

(ii) Female

(4) What is your highest level of education?

(i). Certificate  (ii) Diploma  (iii) Higher Diploma

(iv) Degree  (v) Post Graduate Diploma  (vi) Masters

(vii) Ph.D.

(5) What is your professional background? Please write in the space provided  
-----

(6) For how long have you served in your current position?

(i) Less than 6 months  (ii) 6 months-5 years

(iii) 5-10 years  (iv) Above 10 years

**Section 2: Technical Factors which influence health information utilization in making decision**

(7). On a scale of 1-5, to what extent do you agree with the following statements? Use the key below.

**Key:**

**5-Strongly Agree (SA);**

**4-Agree (A);**

**3- Neutral (N);**

**2- Disagree (D);**

**1- Strongly Disagree (SD)**

Statement	Score				
	SA	A	N	D	SD
I have been trained on HIS					
I have adequate staff trained on HIS					
I have the skills in data analysis					
I have the skills to interpret data					
I have the skills in data/information presentation					
I use manual system of data collection					
I use standardized tools for data collection					
I have adequate tools for health information management					
Use of IT is complex and this hinders my routine activities					

(8). If you are trained on HIS, where did you acquire the training?

(i). Pre-Service Training

(ii) On Job Training

(iii) Seminars/workshops

(iv) Others (specify).....

(9). What are some of the reasons why you might not be able to analyze data? (You can give multiple answers)

(i). Complexity of data analysis

(ii). Lack of equipment for data analysis

(iii). Someone else does the analysis

(iv). No need for data analysis

(v). Others, (Specify).....

(10). Apart from the skills in data interpretation, analysis and presentation, which other skills do you require? (Multiple responses can be given)

(i). HMIS

(ii). Survey /Research

(iii). Data utilization

(iv). Planning

(v). Computer software

(vi). Others, (Specify) .....

**Section 3: Organizational factors which influence health information utilization in making decision**

(11). On a scale of 1-5, to what extent do you agree with the following statements? Use the key below

**Key:**

- 5. Strongly Agree (SA);**
- 4. Agree (A);**
- 3. Neutral (N);**
- 2. Disagree (D);**
- 1. Strongly Disagree (SD)**

Statement	Score				
	SA	A	N	D	SD
There are feedback mechanisms on health information utilization					
There is sharing of best practices on HIS					
Feedback on HIS is only from the lower level managers to the top-level managers					
As managers, we hold meetings with stakeholders to discuss HIS					
As managers, we review reports on HIS					
As a manager I offer supportive supervision on HIS activities					
There is adequate resource allocation for support supervision on HIS (financial, human, infrastructure and supplies)					
There is recognition and reward systems for good performance on HIS					

(12) If you agree to holding meetings to discuss/review reports on HIS, how often do you do this?

- (i). Daily
- (ii) Weekly
- (iii) Fortnightly
- (ii). Monthly
- (v) Quarterly
- (vi) Annually

Using the scale in question (11) above, please respond to the following statements on question (13) below

(13) Supportive Supervision focuses on the following areas of HIS

Statement	Score				
	SA	A	N	D	SD
Enhancing technical competency on HIS					
Assess the quality of the generated data/information					
Ensuring that health facility/facilities' performance is based on Health Information					
Ensuring that patients' management is based on Health Information					
Ensuring that resource allocation/reallocation is based on Health Information					
Sharing of best practices on HIS					

**Section 4: Factors related to Behavior which influence health information utilization in making decision**

On a scale of 1-5 please respond to the following statements

**Key:**

- 5. Strongly Agree (SA);**
- 4. Agree (A);**
- 3. Neutral (N);**
- 2. Disagree (D);**
- 1. Strongly Disagree (SD)**

(14) To what extent do you agree with the following statements regarding perceptions on HIS as a behavior factor that influence the health information utilization for decision making



Statement	Score				
	SA	A	N	D	SD
Not necessary because there are other bases for decision making in health systems					
It is a very tedious process; from data collection, data analysis, information generation and information utilization					
It is a complex and boring process					
It is not my work; someone else should be responsible for HIS activities					
There are no tools for data collection and analysis					
Health information utilization in decision making is a burden to my work					
Health information can be utilized to monitor my work so I don't advocate for its use					
Health information can be utilized for medico-legal issues facing healthcare systems, so it is necessary					
Health information can be utilized in planning for all healthcare activities so its use should be encouraged					
Health information utilization requires expertise on HIS					
Health information utilization for decision making should not be a reserve for the healthcare managers only					

(15). In Health Systems, you make decisions based on the following;

Statement	Score				
	SA	A	N	D	SD
Evidence; facts					
Political opinions					
Health Needs					
Donor demands					
Community demands					
Civil Society demands					
Personal opinion					
DHS					
Cost implications					
Supervisor's directives					
Comparing information with strategic objectives					

(16). What motivates or drives you to utilize health information for decision making?  
(Multiple answers can be given)

- (i). Information is key in decision making
- (ii). Confidence to use the generated information
- (iii). Staff competency on Health Information utilization
- (iv). Positive attitude towards data collection and use
- (v). Incentives on information use
- (vi). Having information that add values to my work
- (vii). Adequate and appropriate resources on HIS
- (viii). Management guidance and leadership

**Section 5: Factors related to Quality Data which influence health information utilization in making decision**

(17). Who generates your data/source of your data? (Multiple answers can be given)

- (i). Myself
- (ii). HRIOs at the facilities
- (iii). DHIS
- (iv). Journals/Publications
- (v). Students/Interns at the facilities
- (vi). Healthcare professionals at the facilities
- (vii). Support staff at the facilities

(18). What type of data do you generate in the course of your daily activities? (Multiple answers can be given)

- (i). Outpatient data
- (ii). Inpatient data
- (iii). Clinical cases data
- (iv). Diagnostic data
- (v). Program data (e.g. Malaria, HIV/AIDS, TB)

(vi). Health systems data (finances, infrastructure, Human resource)

(vii). Others, (Specify).....

(19) How often do you receive data/information from the sources mentioned above?

(i). Daily  (ii) Weekly  (iii) Fortnightly

(iv). Monthly  (v) Quarterly  (vi) Annually

(20). On a scale of 1-5, to what extent do you agree with the following statements on the factors related to quality data?

**Key:**

- 5. Strongly Agree (SA);**
- 4. Agree (A);**
- 3. Neutral (N);**
- 2. Disagree (D);**
- 1. Strongly Disagree (SD)**

Statement	Score				
	SA	A	N	D	SD
Data is generated by skilled HIS professionals					
Data is generated using standard tools					
The generated data is always available for use					
There is assured privacy of the generated data					
There are incentives given to data collectors					

(21). Using the scale in question 20 above, please respond to the following statements on data accuracy

Statement	Score				
	SA	A	N	D	SD
Inaccurate data hinders me from routinely using health information to make decisions					

As a manager I have encountered inaccurate data during decision making process					
I use all the information I receive to make my decisions regardless of their level of accuracy					
I have used/relied on other data sources other than RHIS to make decisions					

(22). Using the scale in question 20 above, please respond to the following statements on completeness of data

Statement	Score				
	SA	A	N	D	SD
Reported data sufficiently covers all my health information needs for decision making					
The reported data includes all the necessary dataset reports					
The reported data summarizes the work of all the departments					
The data/information I receive add no value to my decision making due to inconsistencies					

(23). Using the scale in question 20 above, please respond to the following statements on timeliness of data

Statement	Score				
	SA	A	N	D	SD
Data reporting from various levels of health systems is always according to the set national reporting timelines					
Data is always available in time for decision making					
Corrective actions are always taken within reasonable time to address data reporting issues					

### Section 6: Health information utilization in making decision

On a scale of 1-5 below, please respond to the following statements on questions (24) and (26).

**Key:**

- 5. Strongly Agree (SA);
- 4. Agree (A);
- 3. Neutral (N);
- 2. Disagree (D);
- 1. Strongly Disagree (SD)

(24). You have and use the following documents/reference materials on HIS

Statement	Score				
	SA	A	N	D	SD
Guidelines					
Protocols/SOPs					
Annual/Monthly planned targets					
Research publications					
Reports on success stories					
I know the contents of the above documents that I use					

(25). How often do you use the document(s)/reference materials (mentioned above) on information utilization for decision making?

- (i) Always       (ii) Occasionally       (iii) Not used at all

(26). To what extent do you agree with the following statements on utilization of Health Information for decision making?

Statement	Score				
	SA	A	N	D	SD
<b>Availability of Health Information during decision making has ensured the following;</b>					
Adequate professional staffs have been employed in this current financial year					
Professional staffs have been redeployed to various work stations based on service needs in this current financial year					
There are adequate staffing levels across all cadres under my area of jurisdiction					
The percentage of financial allocation to various healthcare activities is adequate					

There are adequate medical supplies thus no stock-outs experienced					
There are adequate resources allocated for conducting health systems research					
There are adequate resources allocated for disease surveillance activities					
There is policy formulation based on the health information provided					
There are strategies developed to ensure access to healthcare services by all patients					
<b>Monitoring and Evaluation of health systems' performance is conducted for the following reasons</b>					
To assess staffs' technical competency on HIS					
To assess staffs' performance on health service delivery					
To ensure health facilities' performance is based on health information					
To ensure patients' management is based on health information					
To ensure resource allocation/reallocation is based on health information					
To share best practices on the overall health systems performance					
<b>Health information is utilized to plan for and perform the following</b>					
Formulation of Health Policies					
Ensure financial allocation/reallocation based on needs					
Develop strategies that ensure access to healthcare services					
Develop strategies for managing epidemics					
Design disease surveillance strategies					
Conduct health systems researches					
In recruitment and selection of Human Resource for Health					
Medical Supplies Management					
Conduct training to staff based on their training needs					
Develop and implement staff retention strategies					
Empower individuals and members of the community with timely and understandable health related information					

(27). What challenges do you experience in utilizing health information for decision making?

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## Appendix 4: Observation Checklist

### Management Level

County  Sub-County  Facility

INDICATORS	YES	NO	REMARKS
<b>Section 1: General Observation</b>			
Available and displayed management organogram			
Available and displayed Service Delivery Charter			
Available SOPs/Guidelines on HIS			
<b>Section 2: Demand for Health Information during decision making</b>			
Available file with record of the number of healthcare professionals employed in the current financial year			
Available file with record of the number of healthcare professionals redeployed in the current financial year based on service needs			
Available file with record of the staffing level against the workload			
Available file with record of financial allocation to HIS			
Available file with record of the medical commodities in stock against the consumption levels			
Available file with record of the medical supplies from KEMSA against the orders made for the commodities			
Available file with record of resources allocated for health systems research			

<p>Available file with record of resources allocated for disease surveillance</p> <p>Available record of policies formulated based on the Health Information provided</p> <p>Available record of strategies put in place to ensure access to healthcare services by all patients</p> <p>Available file with record of the number of staffs trained on HIS</p> <p>Available file with record of the number of staff sensitized on Health Information utilization for decision making</p> <p>Available raw data</p> <p>Available analyzed data</p> <p>Available information in the form of charts, graphs, tables etc.</p> <p>Available functional computer systems</p> <p><b>Section 3: Monitoring and Evaluation of Health System's performance</b></p> <p>Available file with record of the Monitoring and Evaluation conducted in the current quarter</p> <p>Available minutes of meetings held during Monitoring and Evaluation</p> <p>Available Monitoring and Evaluation checklist</p> <p>Available Monitoring and Evaluation reports</p>			
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## Appendix 5: Ethical Clearance



### KENYA METHODIST UNIVERSITY

P. O. BOX 267 MERU - 60200, KENYA  
TEL: 254-064-30301/31229/30367/31171

FAX: 254-64-30162  
EMAIL: [INFO@KEMU.AC.KE](mailto:INFO@KEMU.AC.KE)

23<sup>RD</sup> JULY, 2019

KeMU/SERC/HSM/63/2019

Moses Ochieng Otieno  
HSM-3-7171-2/2016

Kenya Methodist University

Dear Moses,

**SUBJECT: ETHICAL CLEARANCE OF A MASTERS' DEGREE RESEARCH THESIS**

Your request for ethical clearance for your **Masters' Degree Research Thesis** titled **"Determinants of Health Information Utilization for Decision Making among HealthCare Managers in Mombasa County, Kenya."** has been provisionally granted to you in accordance with the content of your research thesis subject to tabling it in the full Board of Scientific and Ethics Review Committee (SERC) for ratification.

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

1. All co-investigators must be kept informed of the status of the thesis.
2. Changes, amendments, and addenda to the protocol or the consent form must be submitted to the SERC for re-review and approval **prior** to the activation of the changes. The Thesis number assigned to the thesis should be cited in any correspondence.
3. Adverse events should be reported to the SERC. New information that becomes available which could change the risk: benefit ratio must be submitted promptly for SERC review. The SERC and outside agencies must review the information to determine if the protocol should be modified, discontinued, or continued as originally approved.

4. Only approved consent forms are to be used in the enrollment of participants. All consent forms signed by subjects and/or witnesses should be retained on file. The SERC may conduct audits of all study records, and consent documentation may be part of such audits.
5. SERC regulations require review of an approved study not less than once per 12-month period. **Therefore, a continuing review application must be submitted to the SERC in order to continue the study beyond the approved period.** Failure to submit a continuing review application in a timely fashion will result in termination of the study, at which point new participants may not be enrolled and currently enrolled participants must be taken off the study.


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




## Appendix 6: NACOSTI Research License

 REPUBLIC OF KENYA	 NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY & INNOVATION
Ref No: 289443	Date of Issue: 23/August/2019
<b>RESEARCH LICENSE</b>	
	
<p>This is to Certify that Mr., Moses Ofeno of Kenya Methodist University, has been licensed to conduct research in Mombasa on the topic: for the period ending : 23/August/2020.</p>	
License No: NACOSTI/P/19/495	
289443 Applicant Identification Number	 Director General NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY & INNOVATION
	Verification QR Code 
<p>NOTE: This is a computer generated License. To verify the authenticity of this document, Scan the QR Code using QR scanner application.</p>	

**Appendix 7: Mombasa County Authorization for Data Collection**





Noted

SUB-COUNTY MEDICAL OFFICER  
 OF HEALTH  
 CHANGAMWE

Date: 6<sup>th</sup> Sept 2019

**DEPARTMENT OF HEALTH SERVICES**  
**OFFICE OF THE COUNTY DIRECTOR OF HEALTH**

Medical Superintendent Hospital  
 P.O. Box 9742 - Mombasa  
 Email: mdsuptudor@pgs.co.ke  
 Date: 28/8/2019

Uhuru Na Kazi Building, 5<sup>th</sup> Floor  
 Email: msachd2013@gmail.com

**REF: MSA/CH/ADM.37/VOL.185**

P.O. Box 91040 - 80103  
 MOMBASA

**DATE: 28<sup>th</sup> August 2019**

The Chief Administrator - CPGH

All the Sub county Medical officers of Health  
 Mombasa County

The facility in charges

Dear Sir/Madam

**RE: AUTHORIZATION FOR DATA COLLECTION BY MOSES O OTIENO**

The above named student is pursuing degree of Masters of Science in health systems management in the school of medicine and health science at Kenya Methodist University.

This office has no objection and therefore Permission has been granted for him to collect data for his thesis on the topic "**Determinants of health information utilization for decisions making among healthcare managers in Mombasa County, Kenya**".



Kindly accord him the necessary support.

Invoice 28<sup>th</sup> August 2019 number: 175823

*Signature*

**Dr Anisa Baghazal**  
**For County Director of Health**  
**Department of Health Services**  
**MOMBASA COUNTY**

Copy to: The County Health Management Team




**Appendix 8: Kilifi County Authorization for Pre-test**

**COUNTY GOVERNMENT OF KILIFI**  
**DEPARTMENT OF HEALTH SERVICES**

When Replying quote  
Email: [chmtkilifi@gmail.com](mailto:chmtkilifi@gmail.com)  
REF: HP/KCHS/VOL.XL/167

P. O. Box 9-80108  
Kilifi  
Date 15<sup>th</sup> July 2019

  
**OFFICE OF THE COUNTY DIRECTOR**

Moses Otieno  
Masters Student  
Kenya Methodist University  
Meru, Kenya.

Dear Sir,


**RE: DEPARTMENTAL AUTHORIZATION TO CARRY OUT PILOT STUDY IN KILIFI COUNTY**


The Kilifi County Department of Health Services is in receipt of your request to conduct a pilot study titled, **“Determinants of health information utilisation for decision making among healthcare managers in Kilifi County,”** that has received approvals from Kenya Methodist University Scientific and Ethics Review Committee **Ref: KeMU/SERC/HSM/63/2019.**

The Department is glad to grant you authorization to conduct your study in **Kaloleni and Rabai Sub Counties** in line with the approved study protocol. It is required that you engage the sub county administration where the study will be taking place prior to commencing data collection.

Upon completion of the study, you will be required to share your study findings, conclusion and recommendations with the Department of Health Services, Kilifi County.

Sincerely,

  
Dr. Cecilia Wamalwa  
Ag. Director of Health Services  
**KILIFI COUNTY**



*Approved by  
Dr. elmi kumu  
21/08/2019.*

*Approved by  
Dr. Matano  
21/08/2019.*

*Approved by  
Do Pedro Saugura Kakan  
23/08/2019*

COUNTY GOVERNMENT OF KILIFI  
The Office of The Sub-County Medical Officer of Health  
RABAI SUB-COUNTY  
Email: [pskakan@gmail.com](mailto:pskakan@gmail.com)  
Tel: 072040004

Cc County Executive Committee Member  
Chief Officer –Medical Services  
Chief Public Health Officer

COUNTY GOVERNMENT OF KILIFI  
The Office of The Medical Superintendent  
Mariakani Sub-county Hospital  
Email: [mariakanihospital@yahoo.com](mailto:mariakanihospital@yahoo.com)  
Mob: 0722 78 04 85