

**INFLUENCE OF INSTITUTIONAL CAPACITY ON UTILIZATION OF
DISTRICT HEALTH INFORMATION SYSTEM: A CASE STUDY OF
HEALTH FACILITIES IN NYAKACH SUB-COUNTY, KENYA.**

BY


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DECLARATION

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

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DEDICATION

I dedicate this work to my beloved husband Mr. Wycliffe Omondi Ojwando for his unwavering support and encouragement.

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LIST OF ABBREVIATIONS AND ACRONYMS

DHIS	District Health Information System
HCWs	Healthcare Workers
HF s	Health Facilities
HIS	Health Information Systems
HMIS	Health Management Information Systems
HRIO	Health Record Information Officer
ICT	Information Communication and Technology
NGO	Non Governmental Organizations
NHIS	National Health Information System
SCHMT	Sub-County Health Management Team
SPSS	Statistical Package for Social Sciences
TAM	Technological Acceptance Model
WHO	World Health Organization

ABSTRACT

Utilization of Health Information System is becoming a major concern locally and globally. This is based on the need for the management to take proactive leadership in data demand and utilization. The system is also vital in decision making process, detecting and controlling emerging health issues, monitoring and evaluation and ensuring equity. Low utilization of health information system by healthcare workers in health facilities has been identified as a challenge in many developing countries including Kenya. This problem was also identified in Nyakach sub-county, Kisumu County where the health care workers do not fully utilize information from District Health Information System despite enormous resources that have been provided to help in its implementation. It is based on this argument that the study aims at determining the influence of institutional capacity on utilization of District Health Information System in health facilities in Nyakach sub-county. The specific objectives were, firstly to determine how employee capacity influence utilization of district health information system in health facilities in Nyakach sub-county. Secondly to establish how availability of funds influence utilization of district health information system in health facilities in Nyakach sub-county. Thirdly to assess the extent to which size of health facility influence utilization of district health information system in health facilities in Nyakach sub-county. The study was conducted in Nyakach sub-county, Kisumu County. It adopted descriptive research design where both quantitative and qualitative data were collected using questionnaires from a total of 20 District Health Information System managers and 124 users in public health facilities in Nyakach Sub County. The researcher adopted stratified random sampling to select the respondents since the population was heterogeneous consisting of different cadres of healthcare workers. Quantitative data was analysed using both descriptive and inferential statistics where pearson-product moment correlation were applied to be able to determine the relationship between institutional capacity and utilization of District Health Information System in Nyakach Sub-County. Validity of the research instruments was obtained through piloting and expert evaluation. Reliability was tested using a test retest method. The findings of the study included a negative correlation between employee capacity and utilization of district health information system, with values being significant for users (-0.479) and insignificant for managers (-0.349). There was also a positive and significant correlation between availability of funds and utilization of district health information system, with the values being significant for users (0.415) and insignificant for managers (0.181). In addition, there was a positive and significant correlation between size of health facility and utilization of district health information system for both users and managers at (0.809) and (0.462) respectively. From the study results, it is evident that the limiting factor to the utilization of district health information system in health facilities is employee capacity and availability of funds. Inadequate employee capacity is mainly due to lack of trainings and skills while availability of funds is mainly due to inadequate staff and lack of infrastructures to support and encourage the use of District Health Information System. In view of the above findings, the study recommended capacity building and mentorship for both the users and managers. This is necessary as it will ensure that both managers have the capacity and skills to effectively utilize District Health Information System in their facilities. Secondly, the author recommends that authorities and ministries should employ more staff and avail more funds to the facilities to effectively run District Health Information System. The findings of the study will be significant in contributing to the basis upon which partners and donors such as non-governmental organizations, religious groups and political systems, can better health care delivery. However, further studies should be done on the subject so that the findings in this study can be confirmed and verified by many more studies.

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Health management information system is a combined effort to gather, process, report and use the information and knowledge to influence policy making, programme action and research (World Health Organization, 2011). Health information system helps to generate the production of information to inform decision making, improve performance, and improve health operations and health status. Kimani & Namusonge (2015), also pointed out that health information system is applied by decision makers in detecting and controlling arising health related issues, monitoring and evaluation towards goals achievement and promoting equity.

Due to its usefulness, health information management system has been adopted globally by national ministries of health as well as hospitals for the management of health services. This is done to help build and develop a health information system aimed at empowering both the users and the beneficiaries (Karuri, *et al.*, 2014). However, despite its intended usefulness, the system has faced a number of challenges both at implementation and utilization levels thus denying the health system a vital resource.

Globally, challenges with information systems have been observed in many studies. A study conducted in Cyprus found that implementation of health information system did not automatically increase organizational efficiency (Rahimi, *et al.*, 2009). In Vietnam the motivation of health care workers to use such system was attributed to low salaries and poor working environment (Dieleman, *et al.* 2003). On the positive note though, a study in Thailand found that community health centers exhibited a high degree of health information system acceptance and use, factor which was tied to previous knowledge, plan to use the system, and enabling conditions (Kijisanayotin, *et al.*, 2008).

Health information system even faces more challenges in developing countries such as Sub-Saharan Africa, which is burdened by disease and poverty. In a study in South Africa, the reasons for failure for the implementation of health information system was that the users did not comprehend the rationale behind its implementation from the beginning and underestimated the difficulty of healthcare responsibilities (Littlejohns, *et al.*, 2003). Still in South Africa, Garrib, *et al.*, (2008), identified delays in forwarding of reports because of poor

understanding of indicators, poor quality of data, and lack of information use by managers as major challenges.

In Ethiopia, the challenges of health information system were low quality data/information as utilization of data at both district and health facility level was inadequate. In addition, monitoring and data based planning were not intrinsic at district level (Abajebel, *et al.*, 2011). In yet another study in Ethiopia, Mengiste (2010) found out that implementation of health information system was affected by access to infrastructural resources, availability of adequate manpower, and managerial devotion.

In Malawi, the cause for inadequate use of health information was identified as lack of expertise in accessing information systems, applying it and interpreting results, resource constrains, leadership issues, and lack of holistic vision/approach for management of data (Chaulagai, *et al.*, 2005). In Liberia, there was inadequate capacity in relation to data quality assessment and analysis among most of the health facilities. In addition, there was lack of institutionalized data quality checks hence leading to varied data quality from various facilities depending on supporting partners. There were also behavioural and organizational determinants to use of health information system (RBHS, *et al.*, 2012).

Kenya like many other global and African countries has adopted health information system to help realize Kenyans Vision 2030 of health provision on providing equal and cheaper quality health services to all Kenyans. To achieve this, the first Medium Term Plan 2008-2012 of the Vision 2030 noted the need to enhance the national health information systems to cater for adequate information for monitoring health goals and empowering individuals and communities with timely and understandable information on health (Karuri, *et al.* 2014).

According to KIRA (2014), health assessment that was conducted in different counties by the Ministry of Health between 2000 and 2010, found rising demands for health information that was not met fully despite the introduction of health information systems in Kenya. It was also established that the system in use then was weak and poorly integrated. Therefore, Kenya's Health Information System Division within the Ministry of Health was charged with the responsibility to overhaul the system, replacing it with the electronic Health Information System thereby referred to as EHIS thus facilitating production, analysis and reporting of quality health information for better decision making process (Karuri (b), *et al.* 2014).

District Health Information System can be described as a tool meant for collection, validation, analysis, and presentation of data, modified to integrate all the activities of health information (Asangansi & Braa, 2010). It can also be defined as an open-source software initially developed by the Health Information Systems Programme (HISP) at the University of Oslo, Norway. Since then it has evolved into a globally distributed development strategy. The software has been adapted for national Health Information Systems deployment in seven countries - Kenya, Tanzania, Uganda, Rwanda, Ghana, Liberia, and Bangladesh. In addition, more than 20 countries have made use of DHIS at sub-national, programme specific or at pilot levels (Braa & Muquinge, 2007).

District Health Information System was designed to assist in collecting analyzed daily data from all health facilities in a country. It was also meant to enhance decentralized decision making and management at the facility level. DHIS grant health care workers the opportunity to analyse the levels at which they offer their services, predicting service requirements, and assessing their performance against targets (Garrib, *et al.*, 2008).

DHIS is made up of two parts: the first part is for data collection, collation and analysis and this takes place at the facility level, and the second part is the DHIS database which is used to processes data. Data are generated daily from all the service delivery points by a facility, as well as periodically on infrastructure and human resources. These are produced by means of content analysis system which include; registers and data collation forms. The information gathered are sent on a monthly basis to the sub-county level where they are coded using DHIS software, after entry data is cleaned and then analysed. Finally a report is submitted to the district, provincial and national health departments. (Garrib, *et al.*, 2008)

The District Health Information System has since been developed further; Kenya implemented the use of District Health Information Software (DHIS2) countrywide in 2011. The successful roll out of DHIS as the national reporting system provided a strong foundation for the development of “One unified and integrated, country owned, country led, National Health Information System (NHIS).” In order to achieve this, there was need to transition all existing parallel reporting systems into the DHIS (Braa, *et al.* 2010). However despite the successful roll out, DHIS has faced some challenges in the implementation, adoption, use and problems arising from the health care workers that affects the successfull utilization of DHIS in health facilities.

According to Nutley and Reynolds (2013), health information systems data are collected at health facilities about populations they serve, their health needs and the services provided to meet those needs. These data are then used to populate reports that are required by the varied national health programs. However, once these data are keyed into the health information system, they are not considered or used by the health facility themselves or their district or regional health management team for the management of the health services thereby helping to improve the quality of service delivery.

Several studies have been done to understand and solve the above problem. For example, a case study of Kenyatta National hospital to investigate the factors influencing the provision of services in the hospital revealed that low employee capacity affected service delivery by 98%, while inadequate use of technology in health service delivery led to a decrease of provision of quality health services by 91.7%. In addition, other factors that affected the quality of services include ineffective communication channels and inefficient financial resources by 76.8% and 67.1% respectively (Kimani & Namusonge, 2015).

In another study conducted by Odhiambo (2005), in Bungoma district found that health care workers had not received adequate training on strategic information management. In addition, a study in Nairobi by Kimani & Namusonge (2015), identified age, lack of user involvement, lack of adequate knowledge on the use of the health information system, understaffing, change implementation, lack of refresher training, duration taken to repair the system when it breaks down and motivation as factors that influenced health information system. Karuri, *et al.*, (2014), identified challenges such as inadequate infrastructure, low computer proficiency, inadequate staffing, and incomplete data as the ones lowering its demand for use.

A study of utilization of data at community level in Nyalenda slums, Kisumu county found local ownership and utilization of data developed at the community. On the other hand, the study also pointed out that training was of high importance to ensure that accurate data is collected, collated, disseminated and used for planning on how health interventions can be implemented in the community (Jeremie, *et al.*, 2014).

It is evident from the above studies that implementation and utilization of health information system is still a big challenge especially in Sub Saharan Africa such as Kenya, hence the need for further research to understand the underlying issues in relation to utilization for health

management. In addition, from the discussions above, it has been observed that challenges vary between countries, regions and facilities, hence the need to understand how employee capacity, availability of funds and size of healthcare facility influence utilization of district health information system at facility level. Such studies are necessary to inform the national authorities to come up with viable and adequate solutions.

The above studies and many more have focused mainly on health information system, health service delivery and challenges facing the use and implementation of health information system. However such studies have not looked at why the health facilities do not utilize the data generated from DHIS for health management within their facilities. Secondly, many studies have been case studies focusing on facilities or district. However, such studies have focused more on the health providers leaving out the opinion of the facility managers. For better understanding, the gap needs to be filled through having two level studies focusing on both the health provider and facility managers. In addition, DHIS is still relatively new in Kenya and in health facilities, as a result not many studies have been done on it hence the need to do more studies and fill up the gap.

1.2 Statement of the Problem

District health information system (DHIS) should enable the health facility in-charges and the health care workers to easily access health information and make informed decision, planning and coordinating health services in order to achieve quality health service delivery. Due to this, the process of accessing DHIS for report generation should be concise and accurate enough that can be easily understood by all the DHIS users.

Usually, health facilities use DHIS to collect data about populations they serve, their health needs and the services provided to meet those needs. However, often once these data are keyed into the health information system, they are not considered or used by the health facility themselves or their district or regional health management team for the management of the health services to help them improve the quality of service delivery. This was confirmed by KIRA (2014), who observed that despite the implementation of the health information systems for health management in Kenya, a health assessment conducted in the country by the Ministry of Health between 2000 and 2010, still found rising demands for health information by the county and sub-county health management team and the health facilities that were not yet met fully.

It is against the above backdrop that researcher identified the need to do further studies to understand and solve the problem. As the case of many regions in Kenya, it has been observed that in Nyakach Sub County, Kisumu County, the health care workers do not fully utilize information from DHIS despite enormous resources that have been provided by the Kenyan government, Non-governmental organizations and some stakeholders to help in the implementation of health information system especially DHIS.

Therefore in an attempt to understand the problem, research should focus on factors that might be contributing to the situation such as the effects of institutional capacity on the utilization of DHIS. The researcher therefore intends to look at the institutional capacity of the public health facilities in Nyakach Sub County and how it affects utilization of DHIS. This will be achieved by looking at the variables that constitute institutional capacity such as employee capacity, availability of funds and size of health facility which are factors that are believed to influence utilization of DHIS for decision making, planning and coordination of health services. The researcher will also consider the opinions of the health facility managers who have been left out in the previous studies.

1.3 Purpose of the Study

The study aimed at determining the influence of institutional capacity on utilization of district health information system in health facilities in Nyakach Sub-County, Kisumu County.

1.4 Objectives of the Study

The study was guided by the following objectives:

1. To determine how employee capacity influence utilization of district health information system in health facilities in Nyakach Sub County.
2. To establish how availability of funds influence utilization of District health information system in health facilities in Nyakach Sub County.
3. To assess the extent to which size of healthcare facility influence utilization of district health information system in health facilities in Nyakach Sub County.

1.5 Research Questions

In an attempt to achieve the above stated objectives, the study was geared towards answering the following research questions:

1. How does employee capacity influence utilization of district health information system in health facilities in Nyakach Sub County?
2. How does availability of funds influence utilization of District health information system in health facilities in Nyakach Sub County?
3. To what extent does the size of healthcare facility influence utilization of district health information system in health facilities in Nyakach Sub County?

1.6 Significance of the Study

Firstly, the partners and donors such as NGOs, religious groups and political system could use findings to know how and where to channel their resources for better health care delivery. The findings of this study would inform the policy makers and the other stakeholders to come up with better mechanisms on improving health information system. This would propel Nyakach Sub-County to move faster towards achieving high quality health care as desired by Kenya Vision 2030. The study would also highlight some of the overwhelming demand for data from donors leading to development of parallel reporting sub-systems.

Secondly, the findings of this study could act as a basis of understanding the factors contributing to poor implementation and utilization of health information system in health facilities. The results could be used by the government to remodel the implementation of health information in facilities, draft health policies and come up with strategies to better health care where decisions are made through use of reliable data. The Sub-County Health Management Team in Nyakach would be informed on the issues influencing the utilization of DHIS at the health facilities. This would enable them to address these issues and possibly roll out the strategy to the rest of the sub county.

Thirdly, the findings from this study could be used by the government and other interested parties to formulate policies on how to improve efficiency through the adoption of utilization of DHIS in Healthcare Centres. By conducting this study, health institutions would learn that through the use of DHIS, not only do they add value to the organization but also give an institution a competitive advantage. The study would benefit the government and other implementing partners in learning what is ailing the successful utilization of DHIS. The

information gained can in turn be used to improve on those areas so as to improve the overall quality of health. The findings would contribute to the body of knowledge of electronic health information systems to the health sector.

Finally, the community could benefit from the study by sensitizing the community members on the utilization of data for management of community services in Nyakach and Kisumu County in general. This would create interest and would result to active participation by the community members. This could enhance the capacity of communities to implement health and health-related development initiatives so that they could contribute effectively to the county's socio-economic development.

1.7 Basic Assumptions of the Study

The major assumptions for this study were that: all information required would be provided by respondent within the required timeframe, respondents would cooperate with the study team hence would be truthful and honest in their responses to research questions and last but not least, finances would be available, therefore there would be no constrains and hindrance to the research.

1.8 Limitation of the Study

It was thought that the researcher could find it difficult to convince the healthcare workers who might doubt the intention of the study to participate in the study. This was mitigated by explaining to the respondents the importance of the study and a letter from the institution was shown to the respondents.

The researcher could also encounter a problem in getting the key respondents to participate in the study due to their busy schedules. This was mitigated by constant follow ups and scheduling meetings at the respondents' convenience.

Another limitation that the researcher could experience was poor infrastructure due to poor roads. This was mitigated by hiring boda boda's and conducting a feasibility study to familiarize oneself with the area before conducting the study.

1.9 Delimitations of the Study

This study was conducted in public health facilities in Nyakach Sub County and it left out the private health facilities.

1.10 Definition of Significant Terms as Used in the Study

Health institutions: Refers to public hospitals where healthcare is provided. They range from dispensaries, health centres, Sub county hospitals to county hospitals (Winter, 2011).

Institutional capacity: This refers to different identities that distinguish one health institution from the other. They include the properties that allow an organization to survive, to grow, diversify and become more complex.

Employee capacity: Refers to employee's empowerment and identity in terms of training, skills and perception.

Size of the health facility: Refers to the categories of the health facilities from small clinics to large hospitals. It also looks at staffing levels and services available.

Availability of funds: This is the accessibility to finances and other assets that could be drawn on by a person or organization in order to function effectively.

District Health Information System (DHIS): This is an open-source software used for data collection, validation, analysis, and presentation, meant to integrate health information systems management" (Braa, *et al.*, 2010).

Utilization: Putting something into use or turning it into profitable account.

Data: Refers to facts and figures collected together for reference or analysis

Data Utilization: Refers to putting the collected, collated and synthesized information from patients in use to appropriately inform decisions, procedures and policies to improve patient management and treatment outcomes in health care facilities.

Government Policy: Any course of action by the government aimed at improving activities.

Staff Demographics: Refers to the category in which a staff member is classified.

Data-driven management: It is a way of making conclusions about the data and implementing management on the knowledge gathered from one's judgment to assist in improving patient outcomes (Sherrod, *et al.*, 2010).

1.11 Organization of the Study

This research project report has been organized in five chapters; chapter one concerns the introduction to the study. It presents the background of the study, followed by statement of the problem, purpose of the study, objectives of the study, research questions, significance of the study, basic assumptions of the study, limitation and delimitation of the study, definition of significant terms and organization of the study. Chapter two represents the introduction, literature review on influence of institutional capacity on utilization of DHIS in health facilities under a number of themes; it also has theoretical framework, conceptual framework and summary of literature review. Chapter three describes the methodology that was used to conduct the study which included research design, sampling techniques, the population from which the data was obtained, the research procedures, data collection techniques and means of data analysis. Chapter four contains data analysis, presentation, interpretation of results and discussion. Chapter five includes the summary of findings, discussions, conclusions and recommendations. This chapter gives a clear conclusion and recommendation including contribution of the study to the existing body of knowledge and suggestions for further research. Lastly, it has section of references and appendices.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter reviews the relevant literature on health information system and aspects of institutional capacity that affects the utilization of health information system. The chapter first defines the meaning of health information system then proceeds to outline the history of health information system in Kenya, its implementation and utilization within the Kenyan health sector. Secondly, the chapter discusses the relevant literature on the institutional capacity that affects the utilization of health information system in health sectors. This is achieved by looking at aspects such as employee capacity, availability of funds and size of health facility. Discussion of the above aspects entails looking at the influence of employee capacity on utilization of health information system, influence of availability of funds on the utilization of health information system and, influence of the size of health facility on utilization of health information system. Thirdly, the chapter details the conceptual framework by outlining dependent, independent and intervening variables and how they relate to each other. Finally the chapter ends with the summary of the literature

2.2 Health Information System in Kenya

Health assessment conducted in the country by the Ministry of Health between 2000 and 2010, found rising demands for health information on health but a weak and poorly integrated Health Information System (HIS). Therefore, Kenya's HIS Division within the Ministry of Health was given the mandate to replace the existing system with the Electronic Health Information system which could assist in production, analysis and reporting of quality health information for making informed decision (Karuri (b), *et al.*, 2014).

District Health Information Software (DHIS) can be described as a tool for collection, validation, analysis, and presentation of data. It is meant to integrate management activities relating to health information in health facilities (Braa, *et al.*, 2010). It can also be defined as an open-source software initially developed by the Health Information Systems Programme (HISP) at the University of Oslo, Norway. Since then it has evolved into a globally distributed development strategy (Braa & Muquinge, 2007).

The software has been adapted for national Health Information Systems (HIS) deployment in seven countries - Kenya, Tanzania, Uganda, Rwanda, Ghana, Liberia, and Bangladesh. Now

more than 20 Countries have made use of DHIS at sub-national, programme specific or at pilot levels. The DHIS was developed to collect combined daily data from all health facilities in a country and it is meant to enhance decentralized decision making and management of delivery of services. The DHIS grant health care workers to analyse the levels at which they offer their services, predicting service requirements, and assessing performance against targets (Garrib, *et al.*, 2008).

According to Karuri, *et al.* (2014), Information acquired from health systems (HS) is very important for management in monitoring health activities, evaluating and improving the health service delivery. However, the collection, collation, compilation, analysis and reporting of health data in most developing countries is facing a number of problems resulting into inadequate, less accurate and delayed data which is not helpful for health decision-making.

2.3 Influence of Employee Capacity on Utilization of District Health Information System.

Employee capacity as used in this study refers to employee's empowerment and identity in terms of training, skills and perception. Historically, patient care was influenced by the experiences and opinions of health care workers (Kania, 2006). Hence the DHIS was developed to boost the employee capacity for better health service delivery.

DHIS is a tool that was developed to empower health workers to improve health services. It was developed through a prototyping approach. The software has gone through numerous iterations in response to inputs received from users in the health sector in many developing countries (Braa, *et al.* 2004). Utilization of DHIS in health management has experienced significant dissatisfaction amongst health care professionals (Hackl, *et al.* 2011), which remains a significant barrier for the proliferation of Electronic Health Records (EHRs) in the delivery of care services. Mitigation to this problem is both a timely and complex undertaking but is paramount. Therefore, a thorough study is needed to identify the factors contributing to technology acceptance in health care domain (Buntin, *et al.*, 2011).

Past studies on technology acceptance and adoption have shown that adoption of EHRs is not as high as expected. A number of reasons are given to be contributing for the slow adoption and these have been categorized into eight by Boonstra and Broekhuis (2010) as financial, procedural, time, psychological, social, legal, organizational, and process of change. They

also added that, health workers are concerned about the use of ERHs that are founded on their individual issues, knowledge and perceptions. The perception of what HER system can deliver and the Health Care Professionals' (HCPs) attitudes towards it can significantly enhance acceptance of the system.

This is confirmed by a research conducted by Macleod, *et al.* (2007), the study indicated that people who do not have participation in the Information System (IS) development is due to concept prevailing in public health organizations that their suggestions for IS development and implementations are neither welcomed nor entertained and also increases the time duration of IS development. Similarly Certo (2001), argues that organizational success can be enhanced by building appropriate relationships with the people. From the discussion above, it is evidence that the health care workers are the centre and key to acceptance and adoption of health information system such as DHIS.

According to Rowe, *et al.*, (2005), healthcare workers are crucial for the delivery of adequate health projects, however, insufficient health-worker performance is still a problem that is widespread. Performance can be related to the usage and management of the available resources and sound decision making based on facts and data. However, health care procedures are complex and have potential influences. Proponents of theories and conceptual frameworks posits in explaining health-worker practices. For example the concept of individual policy that postulates that health worker practice is influenced by various patients', personal, administrative, organization and economic factors.

Health worker practice and especially the acceptance and utilization of health information systems such as DHIS is greatly influenced by the health worker capacity. This can be attributed to motivation factors that include; performance, effort, social influence and voluntariness or the aim of using the system (Kijsanayotin, *et al.*, 2008). In addition, health care workers may lack the required skills to obtain data from the health system and even to synthesize the data to get the meaning. (Chaulagai, *et al.*, 2005) or have low computer proficiency (Karuri, *et al.*, 2014). In relation to skills, there has also been the identification of an observed gap between perceived capability to execute HMIS tasks among healthcare workers and actual ability for carrying out tasks assigned to them (RBHS, *et al.*, 2012).

Other factors includes lack of user involvement in the Health Information System (Kimani & Namusonge, 2015) or lack of ownership of the data and the system to enable the very

important learning-by-doing processes which can significantly complement the formal training and support activities (Manya, *et al.*, 2012). Lack of improved dissemination of public health information (Karuri, *et al.*, 2014) and sensitization of health workers are the key instruments for sharing information that will ensure accuracy in the data collected and the one that is disseminated and it will also encourage use of data at the community level for planning and health interventions (Jeremie, *et al.*, 2014).

According to Abajebel, *et al.* (2011), the above theories can also be adapted to explain the utilization and management of health information system both at national and facility level. The main building block of the health system is health information that provides data required for human resources, financing, and service delivery, to execute their functions. It is also important for the purpose of improving the quality and coverage of health services.

Debell and Chapman (2006), found that parental attainment in terms of education directly relate with the percentage of students using internet at home: statistics were as follows; primary school level (17%); secondary level (34%); diploma (48%); bachelor's degree (56%); and finally university (63%). U.S. Census data indicated a similarly strong relationship between educational attainment and access of internet at home. However, there was a slightly more prevailing influence when it comes to family earnings: primary school level (20.2%); high school level (43.1%); college (62.6%); bachelor's degree (76.8%); and master's degree (81.1%). Results also revealed further, that female respondents were proficient in using landline compared to other ICT facilities, while male respondents were skilled in using all other ICT. This might be due to the fact that most women from the study were not as educated as the men.

According to Vesgo (2007), many women have been granted computer science and computer engineering degrees. In addition, a study conducted (Kirk, 2008), also indicated that there is a fairly steady progress for women who are degree recipients in computer science and engineering in that their numbers continue to grow slowly. However, a recent report indicated a reduction in the percentage of women at all levels despite the increasing numbers of computer science at all levels. Considering all computer science majors in the U.S., only 18.8% were women (Kirk & Zander, 2004).

In many developing countries such as Kenya, majority of health care workers are nurses hence they play a huge role in information technology acceptance and adoption. They are therefore, regarded as key decision makers within the healthcare team with the expectation of using best available evidence for decision making. A meta-analysis done by Stefik and Heater (1989), revealed that nursing practice anchored on evidence promotes patient care unlike the traditional practices. Besides, as nurses are increasingly becoming more engaged in decision making as it is more important for them to utilize the best evidence to make valuable and correct decisions (Mantzoukas, 2007). A study by Kivuti (2009), observed that failed ICT Systems is as a result of failed mismatch between technology capabilities and health care worker constraints.

Several studies have been done on the above matter, for example a study conducted in Iran, showed one major challenge that health system managers are facing is commitment and deep belief of implementation and utilization of modern health information (Panahi, 2000). A study by Gordana in Croatia that looked at the demographic characteristics of nurses and the use of Health Information Systems (HIS) established that there was no difference regarding use of Health Information System (HIS) based on gender. With regards to age, nurses younger than 30 years were more likely to embrace the use of Health Information System (HIS) compared nurses who were older. Nurses who had achieved a bachelor's degree were also more likely to embrace use of HIS than nurses who had only attained secondary level of education.

Similarly, computer science education was also associated with a higher score, whereby nurses who attended classes of medical informatics in their formal education achieved significantly higher score compared to others (Gordana, 2005). A similar study by Amanda that sought to understand why clinicians were not typically engaged in the assessment that was evidence-based, this was done by looking at clinician's attitude toward use of assessment tools that are standardized. The study also established that doctors and psychologists expressed more encouraging ratings in all three domains than clinicians and non-psychologists respectively.

A study in Miami USA by Jensen looking at diagnostic practices by the clinicians, propose that clinicians may not fully agree with evidence-based guidelines. The study found out that psychiatrists were likely to value diagnosis as opposed to other disciplines, whereas

psychologists valued standardized diagnostic tools, private practitioners held less positive view in both domains. In both attitude scales self-reported diagnostic practices were envisaged even though the views of diagnosis utility was more linked with diagnosing and those of diagnostic tools being predictive of its standardized use (Jensen & Hawley, 2010).

Kagasi in her study investigating factors affecting data quality in tuberculosis programme in Oshakati district in Namibia, established that health care workers with training on program indicators were more likely to record accurate and complete data that would encourage data use (Kagasi, 2010). A similar study in Malawi also revealed that provision of technical support and on job training was a key in good data quality capture and use.

In Kenya, it was further revealed that in order to increase Information, communication and Technology (ICT) adoption for data management by nurses, it is crucial that all measures be taken into account before the actual adoption (Kivuti, 2009). It has previously been urged that women tend to be slow in engaging with computing and this is supported by many records of women's negative experiences with ICT hence the effect of non-adoption of ICT in the nursing care fraternity since majority of the nurses in the world are women. In addition, women have often been showed as passive users of ICT (Kivuti, 2009).

From the volumes of literature reviewed, it is evident that there is need for further studies to unearth more understanding on the influence of employee capacity on utilization of DHIS at health care facilities, since there is limited literature specifically addressing the same. This study seeks to shed more light on the same.

2.4 Influence of Availability of Funds on Utilization of District Health Information System.

Funds availability refers to the accessibility to finances and other assets that can be drawn on by a person or organization in order to function effectively. It affects the way and manner in which health care workers utilize technology to assess stored data to guide their day to day planning and decision making (Connely, 2008).

Although most technological challenges have already been tackled, electronic health records are yet to be integrated with health care delivery process and such countries like Australia, New Zealand, Singapore and Canada are investing significant amount in this integration

process (IRMA, 2016). As a result of these efforts, communication with EHRs is bound to become a considerable part of a healthcare professionals daily activities and access to EHRs will be a critical requirement as more of the administrative and clinical processes are handled through ERH systems. If adopted by healthcare professionals and patients, ERHs and related technologies promise enviable benefits to healthcare delivery (IRMA, 2016).

A study conducted in North Viet Nam by Dieleman *et al.*, (2003), indicated that availability of resources can influence both the implementation and utilization of health information system. These may include both the financial and non-financial issues. Financial issues may be related to income and salary while non-financial issues may be related to job stability. While another study conducted in London by Chaulagai (2005), indicated that the economic issues include resource constrains.

In addition, Mengiste (2010) and Karuri, *et al.* (2014), have suggested that inadequate infrastructural resources or contextual variations in the access to infrastructural resources are some of the factors. Other economic factors may include limited resource to allow performance of data quality assessment and data analysis in the county health offices and in the health facilities, and system accessibility (RBHS, et al., 2012) and duration taken to repair the system in cases of break downs (Kimani & Namusonge, 2015).

There are a number of examples of IT implementation failures in organizations leading to a lot of financial losses. Two high-profile examples of IT implementation failures are Hewlett Packard's failure in 2004 that had a financial impact of \$160 million (Koch, *et al.*, 2004) and Nike's failure in 2000, that cost \$100 million in sales that led to a 20% drop in stock price (Koch, 2004b). Unsuccessful adoption and underutilization of ITs have been pointed out to be the key reasons for "productivity paradox"—that is, a contradictory relationship between IT investment and firm performance (Landauer, 1995; Sichel, 1997). This issue is very important given that recent reports recommend that worldwide investment in IT will increase at a rate of 7.7% a year from 2004 to 2008 compared to 5.1% from 2000 to 2004 (Kohli & Devaraj, 2003).

Trade press and academics have suggested that there is need for development and implementation of effective interventions by the managers to enable access of resources and

ensure utilization in order to capitalize on employees' IT use. This aids managerial decision making on successful IT implementation strategies (Cohen, 2005).

According to Jaspersen *et al.* (2005), having the use of DHIS at optimal levels, especially at health facilities, is closely linked to availability of funding for providing various resources which include computing and internet infrastructure, data collection tool, adequate staffing levels and training. The informants were wary of the country's seemingly over-reliance on donor funding in support of these resources. Therefore, the government needs to set aside funding for DHIS to avoid over reliance on the partners. This is because it may lead to health workers not having the required motivation. But if the directive comes straight from the government and DHIS is completely supported as a government tool, then there will be no resistance.

There is also need for adequate training of health workers with the resources available, if at all they are ever going to use DHIS for managing of health services. It is also very important that this training be packaged properly to benefit both the users and the managers. They should be adequately trained and sensitized on the advantages of using the system. This will contribute directly to how well they use the system both for routine work and in generation of information products that can be used in decision making (Jaspersen *et al.*, 2005).

A study conducted in the United Kingdom, shows that DHIS is not adequate enough to provide management information. The study found that there are some elements that hinder utilization of DHIS hence reducing the quality of healthcare services management. These elements included; inadequate DHIS infrastructures which is majorly caused by lack of resources, accurate research on essential information needs, accurate data gathering system, correct data processing and analysing methods, suitable information presentation techniques, and lack of information based decision making and policy development (Omar & Charimari, 2005).

According to the findings of a study conducted in South Africa in 2006, lack of indicators regarding human resource led to inadequate staff needs, inadequate employment and distribution of human resources in health facilities. Urban and rural health facilities were unable identify accurate indicators. Therefore, there was unreliable clinical library equipment

in district facilities. Studies of DHIS in other countries indicate that there are weak coordination between district health system and other (Muyepa, 2006).

Muyepa, (2006), indicated that there was an undesirable criteria for DHIS information interpretation compliance by WHO. For example, there were not any comparison between obtained performance data and information with goals and standards and therefore, there was no report produced in local facilities. The study findings concerning DHIS monthly written feedback criteria compliance with WHO criteria was also undesirable due to lack of appropriate surveillance that should be done on health facility performance. In another study done in Malawi, health information systems revealed additional challenges; such as lack of systematic utilization of data and information in decision making process (Muyepa, 2006).

In Kenya, a study conducted on DHIS utilization showed that challenges with connectivity influenced its utilization. This is because; connectivity varies in Kenya and this is similar to electricity and mobile telephony. It is thus difficult to implement direct data entry in DHIS by health facilities not unless the infrastructure at these levels is enhanced (Karuri *et al*, 2014).

From the volumes of literature reviewed, it is evident that there is need for a study to unearth more on the influence of availability of funds on utilization of DHIS at healthcare facilities, since there is limited literature specifically addressing the same. This study seeks to shed more light on the same.

2.5 Influence of the Size of Health Facilities on Utilization of District Health Information System.

Size of health facility as used in this study refers to the categories of the health facilities from small clinics to large hospitals. It also looks at staffing levels and services available. Health care facilities depending on their sizes have different organizational demands that may include; cumulative wants and desires relating to a particular good or service.

The organizational demand can come from the patients, manager, partners and the health system as an organization. Health managers require an organized system for information management to assist them in planning for health care interventions in the community and achieve maximum benefit from their endeavour to ensure that primary care is supported. This can be achieved by collaborative partnership among the community, government, local and international partners on the ground (Jeremie, *et al.*, 2014).

However, the above can only be made possible if the managers understand, use and see the need of information system and thereby creating a demand for it. For the demand to be created, the managers needs to understand why users need to effectively utilize the system (Rahimi, *et al.*, 2009), outline to users and make them understand the reasons for implementation from the outset (Littlejohns, *et al.*, 2003). Challenges such as lack of information ownership at different levels, in addition to the still unmet demand for data for better quality of health services (Karuri, *et al.*, 2014) should be addressed. Managers must also perform HMIS activities in terms of assessing data quality, analysis and use of information which is not adequate both at county health office and health facility levels (RBHS, *et al.*, 2012).

A study conducted in United States, indicated that an organization comprises of encouraging and antagonistic forces. An organization gets support from stakeholders who are in need of its products and services. Even though the organization is subject to the constraints of public regulations, demands for social responsibility, and meeting aggregate demand that are conflicting. Therefore, it is the role of the manager to be keen about external forces that may affect both the organization and its goal (Boiney, 2000).

However, findings of the study indicate that the management of private health organization is capable in fighting both external and internal environment in order to meet their desired objectives as compared to public health organization. The literature shows that information technology having the greatest impact on how management ought to be and therefore forcing the managers to equip themselves with the emerging new trends (Haiman, *et al.*, 1985).

Similarly, Turban, *et al.* (2004), posits that the quest to improve on the aspects of decision-making that has led managers to use available technologies. In the currently emerging ICTs environment, IT elements which include; e-mail and group support facilities help in improving the coordination among the organizational members in making informed decisions. The use of these ICTs also promotes the organizational communication, which eventually leads decision-making that is very effective (Rockart and Short, 1989). Furthermore ICTs are very helpful means for communicating information thus the use of emails frequently by most executives and the managers of privately owned organizations as they have no doubt that ICTs can convey things effectively (Keri, 2007).

A study conducted by Stoner and Wankle, (1986), shows that executives are responsible for overall management of the organizations at different levels. They institute operating policies and ensure that proper guidance is given on how the organization should interact with its environment. They also play different roles such as interpersonal, informational and decisional. Thus under information role they are responsible for transmitting the information that is received from any source to the members of the organization and at the same time transmits information based on the organization's plans, policies, actions and results to the outsiders (Robins and Decenzo, 2006). To play an informational role successfully, executives require and make the use of ICTs. However, a study revealed that executives of public organizations do not take interest in the adoption and use of ICTs as pinpointed by Ahlan (2005), that the executives in public health organizations do not take much interest in the adoption and use of ICTs, they do not possess awareness about ICTs and have no experience of using the same for solving their unstructured problems.

In addition, a study conducted by Garrib, *et al.* (2008) in South Africa, shows that there has been very insignificant indication that managers are putting into use the information available at the health facilities for decision making even in big hospitals and that the managerial devotion and support greatly influenced the implementation process (Mengiste, 2010). The program managers at headquarters can sometimes operate their programs in isolation and punitive environment which affects health workers motivation, ownership and making use of health information system for adequate decision making (Chaulagai, *et al.*, 2005). Managers may also lack the necessary management knowledge and skills required to perform his or her duty, lack of incentives and disincentives to monitor quality, and inadequate dissemination of information (Chaulagai, *et al.*, 2005).

Partners including NGOs, political parties, media and religious groups can greatly influence decision making where decision is made because of their pressure and not on data (Chaulagai, *et al.*, 2005). For example in Liberia, it was also found that even though all county health offices and health facilities had at least two supervisory visits in three months, institutionalization of data quality assessment had not taken place and that data quality varied in different facilities depending on partners on the ground (RBHS, *et al.*, 2012). Considering health system organizational factors, the assessment indicated limited use of monitoring plans, training plans, supervision reports and feedbacks from mentorship activities (RBHS, *et al.*, 2012).

Organizations are different and there are various institutional characteristics that may determine Health Information System (HIS) utilization that can be whether there is facilitating condition at the facility/institution for Health Information System (HIS) utilization (Kijisanayotin, *et al.*, 2008), the integration of Health Information System (HIS) into healthcare workflow (Rahimi, *et al.*, 2009), the health care worker working conditions (Dieleman, *et al.*, 2003), availability of adequate and qualified manpower at the institution (Mengiste, 2010), leadership issues (Chaulagai, *et al.*, 2005) and adequate planning and coordination of the health information (Jeremie, *et al.*, 2014).

Other factors include lack of holistic vision/approach for management of data (Chaulagai, *et al.*, 2005). A study conducted in Kisumu County, indicated that there is inadequate number of DHMIS personnel who are trained on DHMIS operations (Odhiambo, 2005) and the ease to which an institution put in place systems that enable health care workers to carry out simple data analysis in the system, which should promote data use from the lowest levels and if institution encourages ownership of decision making process for better management health outcomes (Jeremie, *et al.*, 2014).

In view of an organizational perspective, studies done in Kenya, have shown that relaxation observed in large hospitals may be a determinant of the hospital adoption of information systems. Hospital total services have been established to be a predictor of the adoption of administrative information systems, this supports the findings of other researchers whereby the hospital bed size has significantly, positively related to the adoption of healthcare information systems. As to the information processing for influencing innovation adoption, theorists argue that increased uncertainty in various activities, diversity, and interdependence calls for greater amounts of information processing among decision makers to help them achieve a higher level of organizational performance (Chau & Tam, 2000).

In addition, the findings also showed that, only hospitals that have higher information processing needs would more likely adopt IT systems. This study demonstrates no association between the provision of specialized services and information system adoption. This may imply that adoption of information system applications is not related to specialized services. Organizational communication is also a very important determinant in innovation adoption. Communication occurs through channels that are available at different levels and formalities within the organizations. The empirical findings of the study shows that large

hospital with profit gain as the core deliverable with more preferred provider organization contracts are likely to adopt more administrative information systems (Chau & Tam, 2000). Studies conducted in Kenya, shows that one of the challenges that continue to affect the health care sector in Kenya is high workload and low workforce. This is especially experienced in the lower level health facilities like dispensaries and health centres. This compounds the challenge of trying to expand the use of DHIS in the country because some rural health facilities might be having one clinical staff who is expected to attend to several clinical roles and still collect and collate the health information. The situation though is not much better at the sub county and county referral hospitals where the health records and information officer is expected to support roles which are felt to be more important compared to data management, and examples include; patient registration among others (Galbraith, 1974).

These challenges become more complicated by the fact that the managers in charge of these health facilities are in a number of cases not completely aware of the role of DHIS and how it can help them in their daily work. Infrastructural challenges in many health facilities means that even the most proactive ones are not capable of accessing DHIS directly for data entry and information use (Galbraith, 1974).

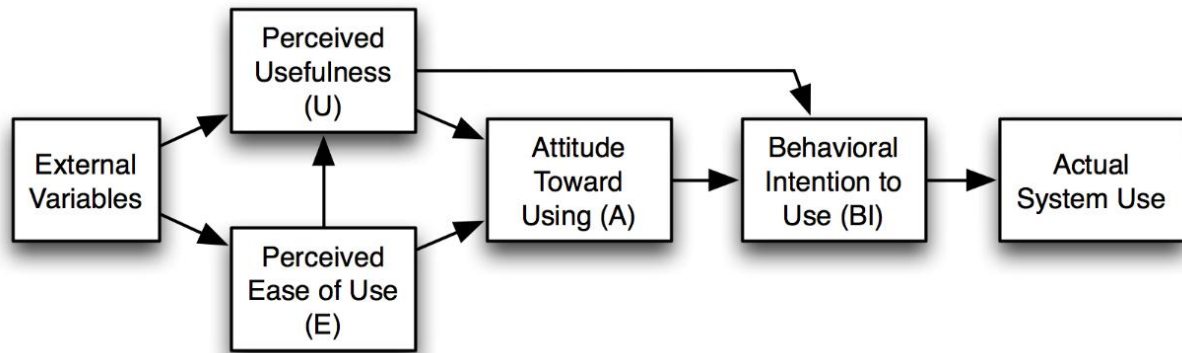
From the volumes of literature reviewed, it is evident that there is need for a study to unearth the extent to which the size of a health facility influence utilization of DHIS, since there is limited literature specifically addressing the same. This study seeks to shed more light on the same.

2.6 Theoretical Framework

Technological Acceptance Model (TAM) is an information system theory that models how users come to accept and use a technology (Davis, *et al.*, 1989). It aims at explaining the behaviour towards usage of ICT by looking at what causes potential adopters to accept or reject the use of information technology. According to Davis, *et al.*, (1989), perceived usefulness and perceived ease of use are fundamental determinants of system use. He defines perceived usefulness as the degree to which an individual believes that using a particular system would enhance his or her job performance while perceived ease of use refers to the degree to which an individual believes that using a particular system would not require any

effort to be inserted. Technology Acceptance Model (TAM) theory of acceptance and adoption of technology can be summarized as shown in Figure 1.

Figure 1: Technological Acceptance Model theory



Source: Davis, *et al.* (1989).

In the employees' Health Information System (HIS) acceptance setting, the TAM suggests that employees are more willing to accept Health Information System if it is perceived to be easily understood, easy to learn, and easy to operate, and is perceived to have associated benefits, including maximizing their productivity, efficiency, and customer satisfaction and lastly minimizing the time to complete a task. That is, as Health information System has a well-designed user interface, there is a likelihood of employees believing that its usage is free of effort. Also, as Health Information System has useful functions, employees are likely to believe that the system is very useful for them to achieve their goals at workplace.

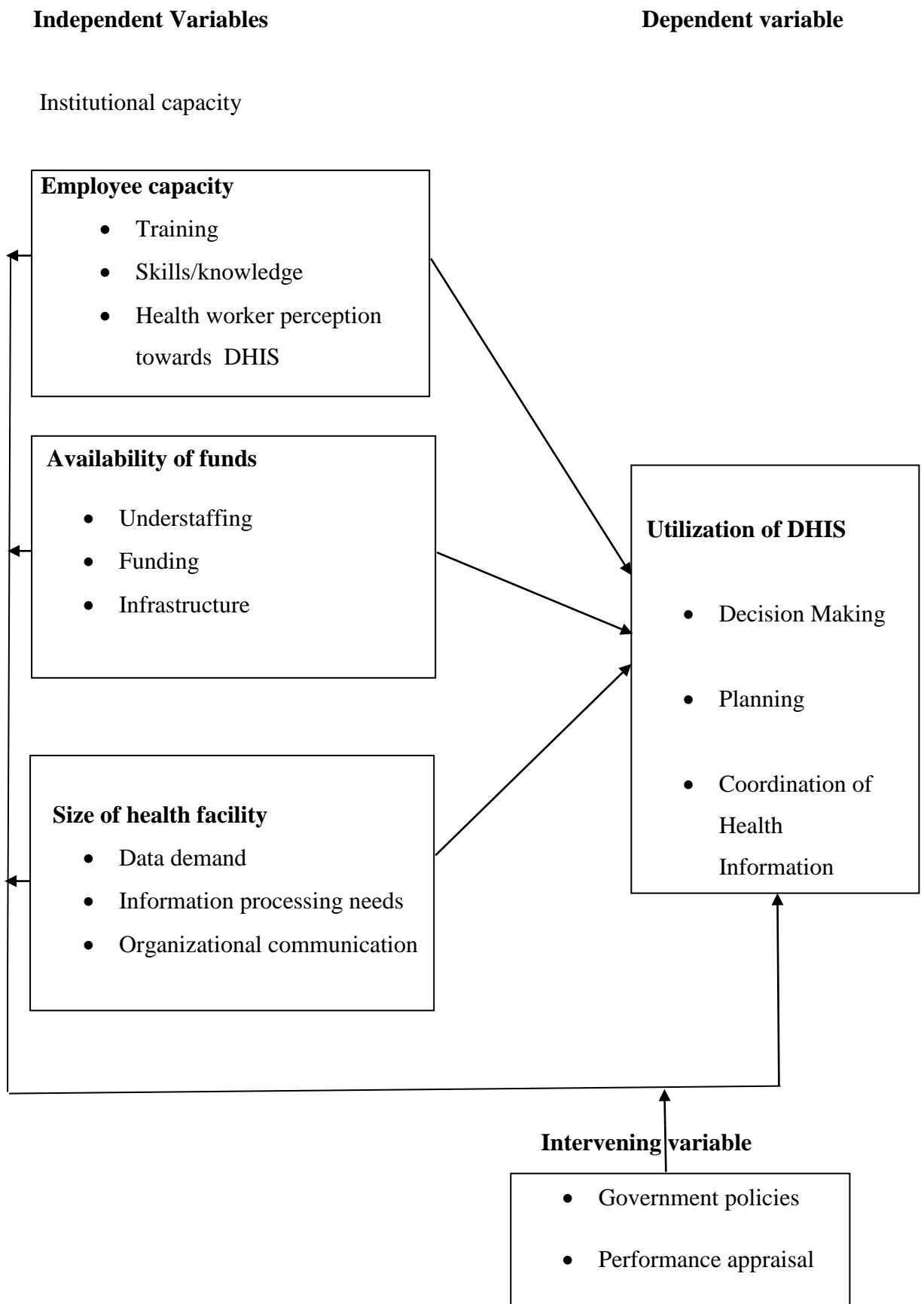
The above theoretical framework can be linked to the study as explained by determinants and utilization of DHIS by health care workers. Aspects such as employee capacity can be used to explain the attitude and willingness to use DHIS. In addition, availability of resources can also dictate the health worker attitude, morale and perceived usefulness. Factors such as size of the health facilities can be used to explain to what extent the health facilities perceive the usefulness of DHIS. The perceived usefulness can enhance job performance, service delivery and reduce work load.

2.7 Conceptual Framework

The conceptual framework is a graphical presentation of variables that interact to produce an outcome. It comprises of independent variable (predictor variable) and dependent variable (outcome) (Miles & Huberman, 1994).

In this study, the researcher focused on the following independent variables, employee capacity, funds availability and size of health facility as factors that relate to the utilization of DHIS which is the dependent variable. Each independent variable had sub variables: employee capacity had training, skills and perception; funds availability had understaffing, funding and infrastructure and lastly size of health facility had data demand, information processing needs and organizational communication. The dependent variable had decision making, planning and coordination of health information as sub variables. However, this relationship was influenced by the intervening variables which included; government policies and performance appraisal (see Figure 2).

Figure 2: Conceptual Framework



2.8 Summary of Literature Review

Health information system faces many challenges both at implementation and during utilization. These challenges can be caused by health care workers, health facilities and other infrastructural amenities. In Kenya, DHIS which is the adopted health information system faces many challenges since its inception in 2010. Some of the challenges have been identified as incomplete and inaccurate data and inadequate utilization of DHIS data for health management in health facilities. These challenges are mainly tied to the health facilities' institutional capacity, which is the enabling environment upon which individuals and organizations interact hence it is considered the driving force behind service delivery and effectiveness of health facilities. Institutional capacity determines utilization of DHIS in decision making, planning and coordination of health information in health facilities. Institutional capacity is driven by factors such as employee capacity, availability of funds and size of health facilities, all of which determines the level of utilization of DHIS in health facilities.

Employee capacity which refers to employee empowerment and identity can be due to employee personal issues, knowledge and perceptions. Personal issues could be related to employee's moods, salaries, motivation, family or social issues. Knowledge is based on adequate training and skills which enable employees to access the health information system and interpret results. Trained and skilled health care workers on health information system are more likely to utilize health information in their respective facilities thereby boosting service delivery. Perception is mainly due to attitude towards health information system, which significantly contributes to acceptance, ownership and adoption of the health information system. Health care worker perception towards health information system could encourage or hinder its utilization in a health facility.

Availability of funds which refers to the accessibility of staff, money, materials, and other assets that can be drawn on by a person or organization in order to function effectively. Scholars have pointed out that utilization of health information system can be greatly affected by lack of or inadequate human resources. Lack of or inadequate staff has been observed to result in poor service delivery and underutilization of resources that supports health service delivery such as health information system. Funds are not only required to purchase

resources such as computer and internet infrastructure that support health information system, but also required to pay wages and aid in capacity to conduct data quality assessment, data analysis and training of staff. Therefore funds are required if there is to be effective utilization of health information system in health facilities. Availability of infrastructure/resources influences both the implementation and use of health information system as it requires adequate infrastructure/resources to be become operational.

Size of health facility as used in this study refers to the categories of the health facilities from small clinics to large hospitals. Health care facilities depending on their sizes have different data demands, information processing and organizational communications. Data demand can come from patients, managers, partners and the health system as an organization. The level of data demand therefore does influence the utilization of health information system in health facilities as data demand encourages utilization. Information processing guides organization interaction through transmission of information within the health facility or with outsiders. However, good information processing in the health sector requires ICT for effective functioning of the health information system in the health facilities. Organization communication leads to effective decision making. Health information system is considered a very useful means of organizational communication through the collecting and dissemination of health information within the health sector. Hence high level of organizational communication can lead to the utilization of health information system in a health facility.

Summary of the literature above indicates that there are many factors within the institution capacity that affects utilization of health information system in a health facility. However, these factors can only be revealed through studies that look at the effects of institutional capacity on the utilization of health information system such as DHIS. Due to limited literature and studies on the same, this study seeks to add to the literature by looking at how institutional capacity influences the utilization of DHIS in Nyakach Sub-Country, Kisumu District.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter outlines how the research was conducted through the research design, target population, sample size and sampling procedure, data collection instruments, data analysis and data presentation.

3.2 Research Design

The researcher adopted descriptive research design. Descriptive research design gives a description of the characteristics of a particular individual, or of a group. It also provides characteristics of a situation or phenomenon by discussing the variables that exist in a given situation and sometimes it highlights the relationship that exists among variables (Christensen & Johnson, 2012).

The researcher adopted this kind of research design because it provides a clear image of the current situation at the health facilities following the utilization of DHIS. Through this research design, the researcher was able to unearth the influence of institutional capacity on utilization of DHIS in decision making, planning and coordination of health information in healthcare facilities.

3.3 Target Population

The target population for this research was 20 health facility managers and 148 health care workers that directly use DHIS and are working in public health facilities within Nyakach Sub County, Kisumu County.

The managers included officers in charge of the health facilities-that is; Clinical officer in-charge, Nursing officer in-charge or Medical superintendent depending on the facility. The cadres of the health workers who use DHIS in the Nyakach Sub-County included; Health records and information officers, Clinical Officers, Nurses and Data clerks. The other health care workers and support staffs were not included in the target population as they were considered to be non-users of DHIS (see Table 1).

Table 1: Target population distributed by cadre

DHIS Managers and DHIS Users

Staff Cadres	Total Population (N)
Facility Managers (DHIS Managers)	20
Clinical Officers	30
Nurses	103
Health Records and Information Officers	9
Data Clerks	6
Total	168

3.4 Sample Size and Sampling Procedure

This section covers the sample size and sampling procedure.

3.4.1 Sample size

Sampling is the process of selecting a representative population from a larger population of the same characteristics for purposes of generalization (Pathak, 2008).

The researcher determined the proportion of the sample that was needed to be able to achieve significant results before doing the actual sampling. This was done by first determining a representative sample size using equation (1) below. The formula below is as adapted by Israel (1992).

$$n_0 = \frac{Z^2 pq}{e^2} \dots\dots\dots \text{Equation (1)}$$

n_0 = representative sample size

Z^2 = abscissa of the normal curve that cuts off an area α at the tails

p = variance or estimated proportion of an attribute that is present in the population

q = confidence level

e^2 = confidence interval.

The value for Z is found in statistical books containing the area under the normal curve. Z score value corresponds to confidence level, for example 90%, 95% and 99% confidence levels correspond to 1.645, 1.96 and 2.576 Z values respectively. In many studies, the above confidence levels have been employed with 5% confidence intervals and 0.5 variance. Since

this study has smaller populations, the sample size proportion was reduced significantly to enable the sample size to provide more information for a sample population. Therefore equation (1) was adjusted to equation (2) below.

$$n = \frac{n_0}{1 + \frac{(n_0 - 1)}{N}} \dots\dots\dots \text{Equation (2)}$$

n_0 = representative sample size

n = sample size

N = population size

The above equation was therefore used to calculate the sample size for each category and cadre in the study. The study employed 95% confidence level, 5% confidence interval and 0.5 variance using equation 1 and 2. The sample size was selected from the total population of facility managers and health care workers who use DHIS in the healthcare facilities within Nyakach Sub-County. In total, there were 20 facility managers and 148 health care workers who directly use DHIS in their day to day work. The results of the above calculations are as shown in Table 2.

Table 2: Sample Size per Cadre

DHIS Managers and DHIS Users

Staff Cadres	Total Population (N)	Sample Size (n)
Facility Managers (DHIS Managers)	20	20
Clinical Officers	30	28
Nurses	103	81
Health Records and Information Officers	9	9
Data Clerks	6	6
Total	168	144

3.4.2 Sampling Procedure

The researcher adopted stratified random sampling method to select the respondents since the population was heterogeneous constituting of different cadres of healthcare workers who directly use DHIS which are the strata in this case as shown in Table 2. After this, each strata

became homogeneous and to get representation from each strata, a simple random sampling method was used.

3.5 Data Collection Instruments

This study employed questionnaires as research instruments. Questionnaires were used to collect primary data for the purpose of investigating influence of institutional capacity on the utilization of DHIS, where the sample size was 20 facility managers and 124 healthcare workers directly involved in using DHIS in health facilities within Nyakach Sub-County, Kenya.

A questionnaire was chosen because it enhances anonymity of respondents and uniformity of questions, thus allowing comparability (Mugenda, 1999). The questionnaire was divided into different sections. After the introduction and instructions, it had section A which was Identification, section B-background information, section C-employee capacity and DHIS utilization, section D-availability of funds and DHIS utilization, section E- size of the health facility and DHIS utilization and lastly section F- Utilization of DHIS (see appendix 1 and 2).

3.5.1 Pilot Testing

It refers to trial test of instruments before they are used for data collection to emphasize consistency of responses drawn from respondents. The aim of the test is to enable early identification of weaknesses of the research instruments that might interfere with soliciting intended information for the research objectives. The pilot study was conducted in Nyando Sub-County using a sample size of 14 respondents (10 % 144 respondents sampled for the main study) represented by 2 health facility managers and 12 health care workers who directly uses DHIS.

3.5.2 Validity of the Research Instruments

Validity is a measure of instruments' ability to meet content validity by soliciting similar responses from a group of respondents (Mugenda, 1999). The study tested the validity of the instruments by use of pilot testing and research experts who gave guidance to ensure that the instruments were well constructed to be able to solicit accurate information to answer study objectives.

3.5.3 Reliability of the Research Instruments

Reliability is defined as a consistency of a measure. (Nachmias and Nachmus, 1999). A test can only be considered reliable if it can give the same result repeatedly. In this study, quality of the data was achieved by training the research assistants before the actual data collection. A test retest method was used to test for consistency. The questionnaires were administered within two weeks during the pilot study. Cronbach's coefficient was then calculated for a single question drawn from each objective and also for the dependent variable, values that were found to be higher than 0.7 were considered high reliability of the research instruments.

3.6 Data Collection Procedures

Permission for data collection was sought from the Ministry of Higher Education through the department of National Council for Science and Technology, a letter of transmittal was also obtained from the University of Nairobi. With the two permits, the researcher went to the Sub-County Medical Officer of Health, Nyakach Sub-County to present the permits, explained what the study is all about and its target population.

Discussions on the ethical considerations were held and the researcher was allowed to conduct the study in the Nyakach Sub-County. The researcher explained to the respondents what the study is all about and had to seek for their informed consent. The questionnaires were then administered to the respondents by the research assistants and filled up questionnaires were reviewed for accuracy and completeness upon picking.

3.7 Data Analysis Techniques

Data analysis refers to the operations performed with the purpose of summarizing collected data and then organizing them to be able to answer research questions (Kothari, 2009). The questionnaires were checked for completeness, accuracy and consistency. The data obtained from the questionnaires were both quantitative and qualitative hence data analysis was done in two phases.

Quantitative data was coded into excel then exported to SPSS version 22.0 to aid in data analysis. Descriptive analysis such as frequencies and percentages were used. In addition, inferential statistics in specific pearson correlation coefficient was used to assess the relationship between variables.

Qualitative data that were represented by the open ended questions had to have all the responses given by the respondents noted down. After that the responses were coded to enable them to be analysed using the available statistical package. The coding allowed the researcher to group the responses in various categories. Data was then analysed by use of descriptive analysis technique with the aid of SPSS version 22.0 as a tool. The findings were then presented using tables, frequencies, percentages and correlations.

3.8 Ethical Considerations

The researcher obtained permission to conduct the study from the University of Nairobi, Higher Education Ministry through the department for National Council of Science, Technology and Innovation and also Sub-County Medical Officer of Health, Nyakach Sub-County-Kisumu County. Informed consent was sought from the respondents before the questionnaires were administered to them. Confidentiality of the data collected was done by having the respondents not indicating their names anywhere on the questionnaire. The researcher also dropped a copy of the research project report at the Sub-County Medical Office-Nyakach, where the respondents will be able to access and make use of the findings.

CHAPTER FOUR

DATA ANALYSIS, PRESENTATION, INTERPRETATION AND DISCUSSION

4.1 Introduction

This chapter presents the findings from the data obtained after the data collection process. The data is discussed at two levels that is; the users of DHIS and managers of DHIS.

4.2 Questionnaire Return Rate

The target number of respondents per category and cadre were done as per Table 1 and 2. The researcher was able to obtain 20 respondents from the facility/DHIS managers, and 124 DHIS users. The DHIS users comprised of Clinical Officers, Nurses, HRIOs and Data clerks who were users of DHIS at the health facility. The DHIS managers comprised health facility managers which included medical superintendent, clinical officer in-charge and nursing officer in-charge. The researcher was able to get 100% response rate for the target sample size both for the managers and users. The success of questionnaire return rate was mainly due to constant follow up of the respondents by the researcher and research assistants.

Table 3: Questionnaire return rate

Respondents category	Sample size (n)	No. interviewed	Return rate (%)
Facility managers	20	20	100
Clinical Officers	28	28	100
Nurses	81	81	100
Health Records & Information Officers	9	9	100
Data Clerks	6	6	100

4.3 Demographic Characteristics

Demographic characteristics of the respondents included; type of health facility, gender of the respondent, age group of the respondent, highest level of education, cadre of the health care worker and how long one had served in the facility where he or she is currently based.

4.3.1 Demographic Characteristics for DHIS Users

Demographic characteristics refers to the categories in which a staff member or facility is classified. The data analysis and presentation below is on demographic characteristics of the DHIS users in public health facilities in Nyakach Sub-County.

Table 4: Type of health facility for the DHIS Users

Variable name	Category	Statistics	
		Frequency	Percent (%)
Type of health facility	Referral/County Hospital	17	13.7
	Sub-County Hospital	23	18.5
	Health Centre	24	19.4
	Dispensary	60	48.4
	Total	124	100

The DHIS users were drawn from four types of health facilities, with 17 respondents coming from Referral/County hospital (13.7%), 23 respondents from Sub-County Hospital (18.5%), 24 respondents from Health Centre (19.4%) and 60 respondents from the Dispensary (48.4%). From Table 4, it indicates that majority of the respondents were drawn from the dispensaries which constituted almost half of the response (48.4%). This is attributed to the larger number of dispensaries to the other types of health facilities. In addition, dispensaries are the first level of health provision in Kenya which makes them numerous and spread. The capturing of different levels/category of health facilities in the study should be able to give a holistic view of utilization of DHIS in health facilities.

Table 5: Gender of the respondents for the DHIS users

Variable name	Category	Statistics	
		Frequency	Percent (%)
Gender of the respondents	Male	45	36.3
	Female	79	63.7
	Total	124	100

In terms of respondents' gender, female formed the majority of the DHIS users with 63.7% of the respondents being female while men composed of only 36.3% of the respondents. The results is in agreement with a study conducted by Kivuti (2009) that found than women form the majority of health care workers in Kenya. Since women are considered to generally tend to be slow in engaging or considered passive users of ICT (Kivuti, 2009). The results could

therefore be an indication of a factor that might hinder utilization of DHIS in health facilities. However, Gordana (2005) found that there is no difference regarding use of health information system based on gender.

Table 6: Age of the respondents for the DHIS users

Variable name	Category	Statistics	
		Frequency	Percent (%)
Age of the respondents	20 – 29 Years	89	71.8
	30 – 39 Years	32	25.8
	40 and above Years	3	2.4
Total		124	100

In terms of age, the respondent's age were categorized into three categories that is 20-29 years, 30-39 years and 40 and above years. There were no respondents who were less than 20 years old. The results show that majority of DHIS users were young people within the age of 20 -29 years which constituted 71.8% of the respondents. Younger people embraced ICT more than older people (Gordana, 2005) hence the young age of the respondents in this study should be a driver to the utilization of DHIS in health facilities.

Table 7: Level of education for the DHIS users

Variable name	Category	Statistics	
		Frequency	Percent (%)
Level of education	Bachelor's Degree	15	12.1
	Diploma	104	83.9
	Certificate	5	4.0
Total		124	100

The level of education of the respondents gave three categories, with the majority of the respondents having diploma certificate (83.9%), with 12.1% having a degree certificate, and 4% having certificate. The high number of diploma holders could be attributed to the fact that in Kenya, one needs at least a diploma from Kenya medical Training College to operate as a clinician, though degree and certificate levels can also operate in clinical or non-clinical procedures respectively. Health care workers with at least diploma certificate are more likely

to embrace health information system (Gordana, 2005), hence the results shows that there is the required background knowledge for the effective utilization of DHIS in health facilities.

Table 8: Cadre of the respondents for the DHIS users

Variable name	Category	Statistics	
		Frequency	Percent (%)
Cadre of the respondents	Clinical Officer	28	22.6
	Nurse	81	65.3
	HRIO	9	7.3
	Data Clerk	6	4.8
	Total	124	100

The cadre of the DHIS users were drawn from four main groups? Clinical Officers, Nurses, Health Records Officers (HRIOs) and Data Clerks. Nurses (65.3%) composed the majority of the respondents, followed by clinical officers (22.6%), HRIOs (7.3%) and the least being data clerks (4.8%). The result is in agreement with many studies and national statistics which indicates that health care provision in Kenyan is dominated by nurses (Kivuti, 2009). Nurses are considered to be key decision makers within the healthcare (Stefik & Heater, 1989) hence they may greatly influence utilization of DHIS in health facilities.

Table 9: Years at the facility for the DHIS users

Variable name	Category	Statistics	
		Frequency	Percent (%)
Years at the facility	Less than 1 Year	31	25.0
	2 – 4 Years	73	58.9
	5 – 7 Years	20	16.1
	Total	124	100

The number of years the DHIS users had stayed in the same facilities varies but this was categorized into ages. The result shows that the majority of DHIS users had been in the facility for between 2 – 4 years (58.9%) followed by less than 1 year (25%) and 5-7 years (16.1%). No DHIS user had stayed in their respective facilities for more than 7 years. Short duration stay in the health facilities could be attributed to transfers which is common in health sector. The duration could affect utilization of DHIS through loss of trained staff and

disruption of coordination or could results in knowledge gain through new skilled staff of DHIS. In the above situations DHIS utilization could be positively or negatively affected.

4.3.2 Demographic Characteristics for DHIS Managers

Demographic characteristics refers to the categories in which a staff member or facility is classified. The data analysis and presentation below is on demographic characteristics of the DHIS users in public health facilities in Nyakach Sub-County.

Table 10: Type of health facility for DHIS managers

Variable name	Category	Statistics	
		Frequency	Percent (%)
Type of health facility	Referral/County Hospital	2	10
	Sub-County Hospital	3	15
	Health Centre	5	25
	Dispensary	10	50
	Total	20	100

In the managers' demographics, respondents were as follows, 2 respondents were from the Referral/County hospital (10%), 3 respondents from Sub-County hospital (15%), 5 respondents from Health Centre (25%), and 10 respondents from the Dispensaries (50%). Therefore, as was the case with the DHIS users, majority of the managers were drawn from the dispensaries mainly due to their larger numbers. The capturing of managers from different levels/category of health facilities in the study should be able to give a holistic view of utilization of DHIS in health facilities from the managerial level.

Table 11: Gender of the respondents for DHIS managers

Variable name	Category	Statistics	
		Frequency	Percent (%)
Gender of the respondents	Male	8	40
	Female	12	60
	Total	20	100

The managers had also females as the majority comprising of 60% of the population while 40% of the respondents were males. So for both the DHIS users and managers, the majority of the respondents were females. Since women are considered to be generally slow in

engaging or considered passive users of ICT (Kivuti, 2009), the results could be an indication of hinderance to utilization of DHIS as managers capabilities can also influence employees in the facilities.

Table 12: Age of the respondents for DHIS managers

Variable name	Category	Statistics	
		Frequency	Percent (%)
Age of the respondents	20 – 29 Years	5	25
	30 – 39 Years	11	55
	40 and above Years	4	20
Total		20	100

The DHIS managers resulted into only three age categories, with the 30 – 39 years being the majority and constituting 55% of the respondents while 40 years and above (20%). This could be explained by the fact that for one to get to the health facility managerial level, one requires some years of work experience. Therefore we can observe that there is 10 years age difference between majority of DHIS Users and majority of DHIS Managers. Younger people embraced ICT more than older people (Gordana, 2005) hence the young age of the managers should be a driver to the utilization of DHIS in health facilities.

Table 13: Level of education for DHIS managers

Variable name	Category	Statistics	
		Frequency	Percent (%)
Level of education	Bachelor’s Degree	6	30
	Diploma	14	70
	Total	20	100

As in the case with the DHIS users, the DHIS managers were also mainly holders of diploma certificate (70%) with the remaining 30% being holders of bachelor’s degree. Certificate holders were missing in the managers’ category, which could be due to the fact that they may not be considered qualified enough to head a health facility. Health care workers with at least diploma certificate are more likely to embrace health information system (Gordana, 2005) hence the results shows that there is the required background knowledge for the effective utilization of DHIS in health facilities.

Table 14: Cadre/position of the respondents for DHIS managers

Variable name	Category	Statistics	
		Frequency	Percent (%)
Cadre of the respondents	Medical Superintendent	1	5
	Clinical Officer in-charge	6	30
	Nursing Officer in-charge	13	65
	Total	20	100

The DHIS managers' category had a different category for cadre classification from that of the DHIS users. This is because, as a health provider attains the management level position in the health facility, their cadre/title changes. The three main categories used in many health facilities are Medical superintendent, Clinical officer in-charge and Nursing officer in-charge. Majority of facility DHIS managers were Nursing Officer in-charge (65%) with 30% being Clinical Officer in-charge and 5% being Medical Superintendent. The results could be supported by the fact that many of the respondents were from health centres and dispensaries which are usually headed by Nursing Officer in-charge. In addition, there are more nurses than clinical officers and medical doctors hence the likelihood to find a nurse being in charge of a health facility than other cadres. The result is in agreement with many studies and national statistics which indicates that health care provision in Kenyan is dominated by nurses (Kivuti, 2009). Nurses are core of health provision in Kenya and in many health facilities hence they could greatly influence the utilization of DHIS in health facilities.

Table 15: Years at the facility for DHIS managers

Variable name	Category	Statistics	
		Frequency	Percent (%)
Years at the facility	Less than 1 Year	4	20
	2 – 4 Years	10	50
	5 – 7 Years	4	20
	8 – 10 Years	2	10
	Total	20	100

The DHIS managers had also majority of the respondents who had been at their respective facilities for a period of between 2 - 4 years (50%). It therefore seems that health care workers averagely spend between 2 - 4 years at health facility within Nyakach Sub County.

Frequent managerial transfers could be viewed either as positively or negatively disruption to the utilization of DHIS.

4.4 Employee Capacity

Employee capacity was divided into Trainings, Skills and Perception of the healthcare workers towards DHIS, with questions asked during the interview to capture each.

4.4.1 Employee Capacity for DHIS Users

Employee capacity refers to employee’s empowerment and identity in terms of training, skills and perception. Training was captured by Q10a and 10b, Skills by Q11 and perception captured by Q12g (see Appendix II). The results of the questions/sub-variables are given in the Tables’ 16-20. The Tables show the main variable and sub-variables being measured and their corresponding frequencies and percent values as per ordinal/likert scale.

Table 16: Employee capacity on training for DHIS users

			DHIS Users responses						
Variable name			Level of training/skills/perception						
	Sub-Variable	Statistics	None	Very low	Low	Average	High	Very High	Total
Employee capacity	Training	Frequency	97	6	3	10	1	7	124
		Percent	78.2	4.8	2.4	8.1	0.8	5.6	100

Table 16 shows the results of the sub-variable training levels. For analysis, training levels were categorized into six categories with none, very low, low, average, high and very high representing trainings on topic/component 0, 1, 2, 3, 4, 5 respectively as defined by Q10b (see Appendix II). Employee training can allow employees to learn how to use health information system. Learning through training can lead to the employees having ease of using health information system. This is as explained by the theory of technology acceptance and adoption. The result shows that 97 (78.2%) of the respondents had not been trained on any topic or component of DHIS. This seems to be a big training gap and also a deterrent to utilization of DHIS in health facilities. This finding is supported by the study that was conducted in Bungoma District that found that health care workers had not received adequate training on health information system (Odhiambo, 2005).

Table 17: Employee capacity on skills for DHIS users

			DHIS Users responses						
Variable name		Level of training/skills/perception							
	Sub-Variable	Statistics	None	Very low	Low	Average	High	Very High	Total
Employee capacity	Skills	Frequency	81	17	6	8	3	9	124
		Percent	65.3	13.7	4.8	6.5	2.4	7.3	100

Table 17 shows the results of the sub-variable employee skills levels. For analysis, employee DHIS Skills was also categorized into six categories with none, very low, low, average, high and very high representing skills on DHIS topic/component 0, 1 or 2, 3, 4, 5, 6 or 7 respectively as defined by Q11 (see Appendix II). Acquiring skills by employees can allow employees to use health information system. Skills acquired can lead to the employees having ease of using health information system as explained by the theory of technology acceptance and adoption. The results shows that majority of the respondents 81 (65.3%) had no skills on DHIS. Generally employees acquire skills through some form of training, mentorship or work experience. Like training above, this lack of skills could be a big gap and also limit the utilization of DHIS in health facilities. The results concur with a study by Chaulagai, *et al.* (2005), who found that health care workers may lack the required skills to access information systems and interpret results.

Table 18: Perception of DHIS users towards DHIS utilization

			DHIS Users responses						
Variable name		Level of training/skills/perception							
	Sub-Variable	Statistics	None	Very low	Low	Average	High	Very High	Total
Employee Capacity	Perception	Frequency	0	62	50	4	7	1	124
		Percent	0	50.0	40.3	3.2	5.6	0.8	100

Table 18 shows the results of the sub-variable DHIS employee perception towards DHIS. For analysis, employee perception on DHIS was also categorized into six categories with none, very low, low, average, high and very high representing none / N/A, Strongly disagree, Disagree, Neutral, Agree and Strongly Agree respectively as defined by Q12g (Appendix II).

Employee's perception towards the use and adoption of health information system can lead to employees having a perceived ease/unease use of health information system or perceived usefulness of health information system as explained by Technological Acceptance Model (TAM) theory of technology acceptance and adoption. The results shows that majority of the respondents had either very low perception or low perception of DHIS being at 50% and 40.3% respectively. The very low or low perception of DHIS by users could be a hindrance to acceptance and utilization of DHIS in health facilities.

Table 19: Correlating employee capacity and utilization of DHIS for DHIS users

		Employee Capacity	Utilization of DHIS
Employee capacity	Pearson Correlation	1	-.479**
	Sig. (2-tailed)		.000
	N	124	124
Utilization of DHIS	Pearson Correlation	-.479**	1
	Sig. (2-tailed)	.000	
	N	124	124

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

Table 19 shows correlation matrix between variables employee capacity and utilization of DHIS. It also indicates values for Pearson correlations, Sig. (2-tailed) and number of samples (N) in each variable. It also shows whether the correlation values are significant or not. The result shows that employee capacity was negatively and significantly correlated to utilization of DHIS (-0.479). The negative but significant correlations value therefore shows that employee capacity is a limiting factor to the utilization of DHIS by health care workers in health facilities in Nyakach Sub County. From the results it is evident that the untrained and unskilled users are using DHIS which brings in the question of effectiveness and quality of the DHIS utilization in these facilities. It therefore seems to be a disconnect between employee capacity and utilization of DHIS as usually, the untrained and unskilled staffs are not expected to be effectively utilizing DHIS. In addition, lack of training and skills could mean that employees have not achieved the perceived effortless and convenience in using of health information system as explained by the theory of technology acceptance and adoption.

Table 20: Decision making for DHIS users

			DHIS Users responses							
Variable name		Statistics	Level of decision making/planning/coordination							
Sub-Variable			No ne	Very low	Low	Average	High	Very High	Total	
Utiliza tion of DHIS	Decision making	Health intervention	Frequency	1	1	9	1	88	24	124
			Percent	0.8	0.8	7.3	0.8	71.0	19.4	100
		Public health	Frequency	0	0	11	1	95	17	124
			Percent	0.0	0.0	8.9	0.8	76.6	13.7	100

Employee capacity determines utilization of DHIS especially on the part of decision making. This brings in the need to relate employee capacity and decision making. Table 20 shows the results of the sub-variable decision making under the dependent variable utilization of DHIS. Decision making was defined by two questions Q24b and Q24c representing decision making for health interventions and public health decisions respectively. Each of the questions was categorized into six categories with none, very low, low, average, high and very high representing none / N/A, Strongly disagree, Disagree, Neutral, Agree and Strongly Agree respectively. Decision making for health interventions and public health decisions can allow employees to realize the perceived usefulness of information system as explained by Technological Acceptance Model (TAM) theory of technology acceptance and adoption. The results shows that majority of the respondents in each question (71.0% and 76.6% for Q24b and Q24c respectively) felt that they use DHIS data for decision making in their health practice. The results show that there is adequate utilization of DHIS for decision making yet employee capacity is inadequate. The finding is therefore conflicting as decision making should be influenced by user's capacity.

4.4.2 Employee Capacity for DHIS Managers

Employee capacity refers to employee's empowerment and identity in terms of training, skills and perception. Training was captured by Q10a and Q10b, Skills by Q11 and perception captured by Q12c (see Appendix III). The results of the questions/sub-variables are given in Tables' 21-25. The Tables show the main variable and sub-variables being measured and their corresponding frequency and percent values as per ordinal/likert scale.

Table 21: Employee capacity on training for DHIS managers

Variable name		DHIS Managers responses							Total
		Level of training/skills/perception							
Sub-Variable	Statistics	None	Very low	Low	Average	High	Very High		
Employee capacity	Training	Frequency	17	1	0	0	2	0	20
		Percent	85.0	5.0	0	0	10.0	0	100

Table 21 shows the results of the sub-variable training levels. For analysis, training level was categorized into six categories with none, very low, low, average, high and very high representing trainings on topic/component 0, 1, 2, 3, 4, 5 respectively as defined by Q10b (Appendix III). Manager's training can allow employees to learn how to use health information system. Learning through training could lead to the managers having a perceived effortless use of health information system as explained by the theory of technology acceptance and adoption. The results show that 17 (85.0%) of the respondents had not been trained on any topic or component of DHIS. This seems to be a big training gap and also a deterrent to utilization of DHIS in health facilities. The results are in agreement with a study conducted in Kisumu by Odhiambo (2005), which indicated that there is inadequate number of DHMIS personnel who are trained on DHMIS operations.

Table 22: Employee capacity on skills for DHIS managers

Variable name		DHIS Managers responses							Total
		Level of training/skills/perception							
Sub-Variable	Statistics	None	Very low	Low	Average	High	Very High		
Employee capacity	Skills	Frequency	17	2	0	0	0	1	20
		Percent	85.0	10.0	0	0	0	5.0	100

Table 22 shows the results of the sub-variable employee skills levels. For analysis, managers' DHIS Skills was also categorized into six categories with none, very low, low, average, high and very high representing skills on DHIS topic/component 0, 1 or 2, 3, 4, 5, 6 or 7 respectively as defined by Q11 (see Appendix III). Acquiring skills by managers can allow managers to use health information system. Skills acquired can lead to the managers having the ease of use of health information system as explained by the theory of technology acceptance and adoption.

The results above shows that majority of the respondents 17 (85.0%) had no skills on DHIS. Generally employees acquire skills through some form of training, mentorship or work experience. The results are in line with a study done by Karuri, *et al.* (2014) who pointed out that skills maybe be due to low computer proficiency. In addition, a study in Liberia observed gap between perceived capability to perform HMIS tasks and actual ability for performing the required tasks (RBHS, *et al.*, 2012). Like training above, this lack of skills could be a big gap and also limit the utilization of DHIS in health facilities.

Table 23: Perception of DHIS managers towards DHIS utilization

			DHIS Managers responses						
Variable name		Level of training/skills/perception							
Sub-Variable	Statistics	None	Very low	Low	Average	High	Very High	Total	
Employee capacity	Perception	Frequency	0	1	0	1	10	8	20
		Percent	0	5.0	0	5.0	50.0	40.0	100

Table 23 shows the results of the sub-variable DHIS manager's perception towards DHIS. For analysis, managers perception on DHIS was also categorized into six categories with none, very low, low, average, high and very high representing none / N/A, Strongly disagree, Disagree, Neutral, Agree and Strongly Agree respectively as defined by Q12c (see Appendix III). Manager's perception towards the use and adoption of health information system can lead to manager's having a perceived ease/unease use of health information system or perceived usefulness of health information system as explained by Technological Acceptance Model (TAM) theory of technology acceptance and adoption. The results above shows that majority of the respondents had either high perception or very high perception of DHIS being at 50% and 40% respectively. The high and very high perception of DHIS by users could be a good driver and managerial motivation to the utilization of DHIS in health facilities.

Table 24: Correlating employee capacity and utilization of DHIS for DHIS managers

		Employee capacity	Utilization of DHIS
Employee capacity	Pearson Correlation	1	-.349
	Sig. (2-tailed)		.132
	N	20	20
Utilization	Pearson Correlation	-.349	1
	Sig. (2-tailed)	.132	
	N	20	20

Table 24 shows correlation matrix between variables managers' capacity and utilization of DHIS. It also indicates values for Pearson correlations, Sig. (2-tailed) and number of samples (N) in each variable. It also shows whether the correlation values are significant or not. The results show that manager's capacity was negatively and not significantly correlated to utilization of DHIS (-0.349). The negative and insignificant correlation value therefore shows that manager's capacity is a limiting factor to the utilization of DHIS by managers. In addition, lack of training and skills could mean that managers have not achieved ease of use or usefulness of health information system as explained by Technological Acceptance Model (TAM) theory of technology acceptance and adoption.

Table 25: Decision making for DHIS managers

				DHIS Managers responses						
Variable name			Statistics	Level of decision making/planning/coordination						
Sub-Variable				No ne	Very low	Low	Average	High	Very High	Total
Utilization of DHIS	Decision making	Health interventions	Frequency	0	0	0	1	12	7	20
			Percent	0	0	0	5.0	60.0	35.0	100
	Public Health	Frequency	0	0	2	2	11	5	20	
		Percent	0	0	10.0	10.0	55.0	25.0	100	

Employee capacity determines utilization of DHIS especially as it relates to decision making. This brings in the need to relate employee capacity and decision making. Table 25 shows the

results of the sub-variable decision making under the dependent variable utilization of DHIS. Decision making was defined by two questions Q27b and Q27c representing decision making for health interventions and public health decisions respectively. Each of the questions was categorized into six categories with none, very low, low, average, high and very high representing none / N/A, Strongly disagree, Disagree, Neutral, Agree and Strongly Agree respectively.

Decision making for health interventions and public health decisions can allow managers to realize the perceived usefulness of information system as explained by Technological Acceptance Model (TAM) theory of technology acceptance and adoption. The results shows that majority of the respondents in each question (60.0% and 55.0% for Q27b and Q27c respectively) felt that they highly use DHIS data for decision making in their health practice. The results indicate that there is good utilization of DHIS in many health facilities for decision making yet the managers have inadequate capacity.

4.5 Availability of Funds

Availability of funds was divided into staffing, funding and infrastructure available to health facilities in the support of DHIS, with questions asked during the interview to capture each.

4.5.1 Availability of funds for DHIS Users

Availability of funds refers to the accessibility of finances and other assets that can be drawn by an organization to function very effectively. Employee availability of funds was divided staffing, funding and infrastructure. Staffing was captured by Q16a, funding by Q16c and infrastructure captured by Q16b (see Appendix II). The results of the questions/sub-variables are given in the Tables' 26-30. The Tables show the main variable and sub-variables being measured and their corresponding frequency and percent values as per ordinal/likert scale.

Table 26: Availability of funds in terms of staffing for DHIS users

			DHIS Users responses						
Variable name			Level of staffing/funding/infrastructure						
	Sub-Variable	Statistics	None	Very low	Low	Average	High	Very High	Total
Availability of funds	Staffing	N	0	8	71	5	32	8	124
		Percent	0	6.5	57.3	4.0	25.8	6.5	100

Table 26 shows the results of the sub-variable staffing. For analysis, staffing was also categorized into six categories with none, very low, low, average, high and very high representing none / N/A, Strongly disagree, Disagree, Neutral, Agree and Strongly Agree respectively as defined by Q16a (see Appendix II). The number of staff can lead to attitude of employee towards the use health information system which can either be positive or negative. Staffing level in a health facility can lead to employees having or developing an attitude towards health information system as explained by Technological Acceptance Model (TAM) theory of technology acceptance and adoption.

The results shows that, majority of the respondents (57.3%) felt that there was inadequate staff employed at the facilities to fully make use of DHIS. The results are in agreement with a study conducted in South Africa that showed that inadequate staffing led to questionable delivery of health activities (Muyepa, 2006). This results shows hindrance to the utilization of DHIS in health facilities as there should be adequate staff to adequately oversee the smooth running of the DHIS.

Table 27: Availability of funds in terms of funding for DHIS users

Variable name		DHIS Users responses							Total
		Level of staffing/funding/infrastructure							
Sub-Variable	Statistics	None	Very low	Low	Average	High	Very High		
Availability of funds	Funding	N	0	11	74	8	28	3	124
		Percent	0	8.9	59.7	6.5	22.6	2.4	100

Table 27 shows the results of the sub-variable funding. For analysis, funding was also categorized into six categories with none, very low, low, average, high and very high representing none / N/A, Strongly disagree, Disagree, Neutral, Agree and Strongly Agree respectively as defined by Q16c (see Appendix II). The availability of funds can directly determine employee attitude towards the use of health information system or indirect perceived ease of use. Funding level determines the financial and logistics aspects of health information system hence funding can influence employees having perceived ease of use or attitude towards health information system as explained by Technological Acceptance Model (TAM) theory of technology acceptance and adoption. The results shows that majority of the respondents 74 (59.7%) felt that there was low funds available to the facilities to fully finance DHIS. This results shows hindrance to the utilization of DHIS in health facilities as there

should be adequate funds to adequately oversee the smooth running of the DHIS in health facilities.

Table 28: Availability of funds in terms of infrastructure for DHIS users

			DHIS Users responses						
Variable name			Level of staffing/funding/infrastructure						
	Sub-Variable	Statistics	None	Very low	Low	Average	High	Very High	Total
Availability of funds	Infrastructure	N	0	8	77	8	28	3	124
		Percent	0	6.5	62.1	6.5	22.6	2.4	100

Table 28 shows the results of the sub-variable infrastructure. For analysis, infrastructure was also categorized into six categories with none, very low, low, average, high and very high representing none / N/A, Strongly disagree, Disagree, Neutral, Agree and Strongly Agree respectively as defined by Q16b (see Appendix II). Infrastructure can directly determine employee attitude towards the use of health information system as it requires technology to run on, of which if not availed could create problems of use.

Infrastructure can lead to employees having perceived ease of use or attitude towards health information system as explained by Technological Acceptance Model (TAM) theory of technology acceptance and adoption. The results shows that majority of the respondents 77 (62.1%) felt that the infrastructures/resources available like computers, internet, stationery, and equipment were not enough to effectively enable the smooth running of DHIS in the health facilities. The results is in agreement with a study by Karuri *et al.* (2014), who found that utilization of DHIS is affected by infrastructure such internet connectivity. Therefore, this could be a hindrance to the utilization of DHIS as there should be adequate infrastructure/resources in health facilities to adequately oversee the smooth running of the DHIS.

Table 29: Correlating availability of funds and utilization of DHIS for DHIS users

		Availability of Funds	Utilization of DHIS
Availability of Funds	Pearson Correlation	1	.415**
	Sig. (2-tailed)		.000
	N	124	124
Utilization of DHIS	Pearson Correlation	.415**	1
	Sig. (2-tailed)	.000	
	N	124	124

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

Table 29 shows correlation matrix between variables availability of funds and utilization of DHIS. It also indicates values for Pearson correlations, Sig. (2-tailed) and number of samples (N) in each variable. It also shows whether the correlation values are significant or not. The results shows that availability of funds was low but positively and significantly correlated to utilization of DHIS (0.415). The positive and significant correlations value therefore shows that current available funds have a low contribution the utilization of DHIS in health facilities in Nyakach Sub-County. In addition, inadequate funds could mean that employees have not achieved ease of use and usefulness of health information system, as well as developing a positive attitude towards health information system as explained by Technological Acceptance Model (TAM) theory of technology acceptance and adoption.

Table 30: Planning for DHIS users

				DHIS Users responses						
Variable name			Statistics	Level of decision making/planning/coordination						
Sub-Variable				None	Very low	Low	Average	High	Very High	Total
Utilization of DHIS	Planning	Human resource	Frequency	1	1	53	8	52	9	124
			Percent	0.8	0.8	42.7	6.5	41.9	7.3	100
	Purchases		Frequency	1	1	4	4	69	45	124
			Percent	0.8	0.8	3.2	3.2	55.6	36.3	100

Availability of funds determines utilization of DHIS especially as it relates to health facility planning. This brings in the need to relate availability of funds and planning. Table 30 shows the results of the sub-variable planning under the dependent variable utilization of DHIS. Planning was defined by two questions Q24e and Q24f representing planning for human resource and planning for purchases like equipments and medical supplies respectively. Each of the questions was categorized into six categories with none, very low, low, average, high and very high representing none / N/A, Strongly disagree, Disagree, Neutral, Agree and Strongly Agree respectively.

Planning and use of health information data for planning purposes can allow employees to realize the perceived usefulness of information system as explained by Technological Acceptance Model (TAM) theory of technology acceptance and adoption. The results above shows that in one question (Q24e) there was a mixed results with 42.7% of the respondents indicating they use DHIS at a low level for planning purposes while 41.9% said that they use the data DHIS data for planning purposes at high level. The high utilization for planning purposes is in contrast to employee capacity that showed that majority of the employees were not trained on DHIS and lacked skills on DHIS. However in the other question (Q24f), a number of the respondents pointed out that they use the DHIS data at a high level for planning. The above two results indicate that there is high level of some degree of planning using DHIS data in these health facilities.

4.5.1 Availability of funds for DHIS Managers

Availability of funds refers to the accessibility of finances and other assets that can be obtained by a person or organization to function well. Availability of funds was divided into staffing, funding and infrastructure. Staffing was captured by Q16a, funding by Q16c and infrastructure captured by Q16b (see Appendix III). The results of the questions/sub-variables are given in the Tables' 31-35. The Tables show the main variable and sub-variables being measured and their corresponding frequency and percent values as per ordinal/likert scale.

Table 31: Availability of funds in terms of staffing for DHIS managers

Variable name		DHIS Managers responses							Total
		Level of staffing/funding/infrastructure							
Sub-Variable	Statistics	None	Very low	Low	Average	High	Very High		
Availability of funds	Staffing	N	0	3	6	2	5	4	20
		Percent	0	15.0	30.0	10.0	25.0	20.0	100

Table 31 shows the results of the sub-variable staffing. For analysis, staffing was also categorized into six categories with none, very low, low, average, high and very high representing none / N/A, Strongly disagree, Disagree, Neutral, Agree and Strongly Agree respectively as defined by Q16a (see Appendix III). The number of staff in health facility can lead to attitude of employee towards the use health information system which can either be positive or negative. Staffing level in a health facility can lead to employees and managers having or developing an attitude towards health information system as explained by Technological Acceptance Model (TAM) theory of technology acceptance and adoption.

The results shows that majority of the respondents (30.0%) felt that there was inadequate staff available in the facilities to fully utilize DHIS. This results shows hindrance to the utilization of DHIS in health facilities as there should be adequate staff to adequately oversee the smooth running of the DHIS in health facilities. A study conducted in Kisumu by Odhiambo (2005), indicated inadequate number of DHMIS personnel who are trained on DHMIS operations. In addition, Galbraith, (1974) pointed out that problems that continue to affect the health care department in Kenya is high workload and low workforce mostly in the lower level health facilities like dispensaries and health centres.

Table 32: Availability of funds in terms of funding for DHIS managers

Variable name		DHIS Managers responses							Total
		Level of staffing/funding/infrastructure							
Sub-Variable	Statistics	None	Very low	Low	Average	High	Very High		
Availability of funds	Funding	N	0	2	7	5	5	1	20
		Percent	0	10.0	35.0	25.0	25.0	5.0	100

Table 32 shows the results of the sub-variable employee funding. For analysis, funding was also categorized into six categories with none, very low, low, average, high and very high representing none / N/A, Strongly disagree, Disagree, Neutral, Agree and Strongly Agree respectively as defined by Q16c (see Appendix III). The availability of funds to the facility can directly determine employees and managers attitude towards the use of health information system or indirect perceive ease of use.

Funding level determines the financial and logistics aspects of health information system hence funding can lead to employees and managers having perceived ease of use or attitude towards health information system as explained by Technological Acceptance Model (TAM) theory of technology acceptance and adoption. The results shows that majority of the respondents 7 (35.0%) felt that there was low funds available to the facilities to fully enable utilization of DHIS. This above results show the hindrance to the utilization of DHIS as there should be adequate funds in health facilities to adequately oversee the smooth running of the DHIS.

Table 33: Availability of funds in terms of infrastructure for DHIS managers

			DHIS Managers responses						
Variable name			Level of staffing/funding/infrastructure						
	Sub-Variable	Statistics	None	Very low	Low	Average	High	Very High	Total
Availability of funds	Infrastructure	N	0	5	2	7	4	2	20
		Percent	0	25.0	10.0	35.0	20.0	10.0	100

Table 33 shows the results of the sub-variable infrastructure. For analysis, infrastructure was also categorized into six categories with none, very low, low, average, high and very high representing none /N/A, Strongly disagree, Disagree, Neutral, Agree and Strongly Agree respectively as defined by Q16b (see Appendix III). Infrastructure can directly determine employee and managers attitude towards the use of health information system as DHIS requires technology to run on, of which if not availed could create problems of use. Infrastructure can lead to employees and managers having perceived ease of use or attitude towards health information system as explained by Technological Acceptance Model (TAM) theory of technology acceptance and adoption. The results shows that majority of the respondents 7 (35.0%) felt that there was averagely adequate infrastructures/resources; computers, internet, stationery, equipment to effectively enable the smooth running of DHIS in the

health facilities. Therefore, this could be a hindrance to the utilization of DHIS in health facilities as there should be adequate infrastructure/resources to adequately oversee the smooth running of the DHIS.

Table 34: Correlating availability of funds and utilization of DHIS for DHIS managers

		Availability of funds	Utilization of DHIS
Availability of funds	Pearson Correlation	1	.181
	Sig. (2-tailed)		.445
	N	20	20
Utilization of DHIS	Pearson Correlation	.181	1
	Sig. (2-tailed)	.445	
	N	20	20

Table 34 shows correlation matrix between variables availability of funds and utilization of DHIS. It also indicates values for Pearson correlations, Sig. (2-tailed) and number of samples (N) in each variable. It also shows whether the correlation values are significant or not. The results above shows that availability of funds was very low but positively and insignificantly correlated to utilization of DHIS (0.181). The very low positive and insignificant correlation value therefore shows that current available funds have a very low contribution to the utilization of DHIS. In addition, inadequate funds could mean that employees have not achieved effortless use of health information system or developed a positive attitude towards health information system as explained by Technological Acceptance Model (TAM) theory of technology acceptance and adoption.

Table 35: Planning for DHIS managers

Variable name			DHIS Mangers responses							
			Level of decision making/planning/coordination							
Sub-Variable	Statistics		None	Very low	Low	Average	High	Very High	Total	
			Utilization of DHIS	Planning	Human resource	Frequency	0	0	2	2
			Percent	0	0	10.0	10.0	45.0	35.0	100
		Purchases	Frequency	0	0	0	1	13	6	20
			Percent	0	0	0	5.0	65.0	30.0	100

Availability of funds determines utilization of DHIS especially as it relates to planning by health facilities, hence the need to relate availability of funds and planning. Table 35 shows the results of the sub-variable planning under the dependent variable utilization of DHIS. Planning was defined by two questions Q27e and Q27f representing planning for human resource allocation and purchases of equipments and medical supplies respectively. Each of the questions was categorized into six categories with none, very low, low, average, high and very high representing none / N/A, Strongly disagree, Disagree, Neutral, Agree and Strongly Agree respectively.

Planning and use of health information data for planning for human resource and medical supplies can allow managers to realize the perceived usefulness of information system as explained by Technological Acceptance Model (TAM) theory of technology acceptance and adoption. The results shows that in all the questions (Q27e and Q27f) majority of the respondents (45.0% and 65.0% respectively) indicated that they highly use DHIS for planning purposes .The results above indicates that there is high level of planning using DHIS data in these health facilities.

4.5 Size of Health Facility

Size of the health facility variable was divided into data demand, information processing and, organizational communications as they pertain to DHIS use in health facilities. Questions were asked during the interview to capture each sub variable.

4.5.1 Size of Health Facility for DHIS Users

Size of health facility refers to the categories of the health facilities from small clinics to large hospitals. It also looks at staffing levels and services available. Size of health facility was divided into data demand, information processing and organizational communication as sub-variables. Data demand was captured by Q20, Q21d and Q21e, Information processing by Q21a and Q21b, and organizational communication captured by Q21c and Q21g (see Appendix II). The results of the questions/sub-variables are given in the Tables' 36-40. The Tables show the main variable and sub-variables being measured and their corresponding frequency and percent values as per ordinal/likert scale.

Table 36: Data demand for DHIS users

				DHIS Users responses						
Variable name			Level of data demand/information/communication							
Sub-Variable	Statistics		None	Very low	Low	Average	High	Very High	Total	
Size of the health facility	Data demand	Level	Frequency	0	0	1	27	67	29	124
			Percent	0	0	0.8	21.8	54.0	23.4	100
	Decision		Frequency	3	1	4	3	74	39	124
			Percent	2.4	0.8	3.2	2.4	59.7	31.5	100
	Planning		Frequency	0	0	5	0	77	42	124
			Percent	0	0	4.0	0	62.1	33.9	100

Table 36 shows the results of the sub-variable data demand as captured by level of data demand, demand for DHIS information in decision making and demand for DHIS information for planning purposes. For analysis, level of data demand was categorized into six categories with none, very low, low, average, high and very high representing none / N/A,

Strongly disagree, Disagree, Neutral, Agree and Strongly Agree respectively. Data demand in terms of level of data demand and data demand for decision making and planning can allow employees to realize the perceived usefulness of information system as explained by Technological Acceptance Model (TAM) theory of technology acceptance and adoption. The results show that majority of the respondents in each question (54.0%, 59.7% and 62.1% for Q20, Q21d and Q21e respectively) under data demand there was a feeling that there was high data demand. The results therefore indicate that there is high data demand in health facilities in Nyakach Sub-County. This data demand should be able to drive the utilization of DHIS in health facilities.

Table 37: Information Processing for DHIS users

			DHIS Users responses							
Variable name		Statistics	Level of data demand/information/communication							Total
Sub-Variable			None	Very low	Low	Average	High	Very High		
Size of the health facility	Information processing	System	Frequency	0	4	28	2	85	5	124
			Percent	0	3.2	22.6	1.6	68.5	4.0	100
	Health data	Frequency	1	4	64	6	42	7	124	
		Percent	0.8	3.2	51.6	4.8	33.9	5.6	100	

Table 37 shows the results of the sub-variable information processing as captured availability of a system in place for information processing and high level of health data information processing using DHIS. For analysis, Information processing was represented by two questions; Q21a and Q21b each categorized into six categories with none, very low, low, average, high and very high representing none / N/A, Strongly disagree, Disagree, Neutral, Agree and Strongly Agree respectively. Information processing and a system in place that can allow high processing levels, can allow employees to have a perceived ease of use of health information system as explained by Technological Acceptance Model (TAM) theory of technology acceptance and adoption.

The results shows that majority (68.5%) of the respondents in one question (Q21a) felt that there was high information processing while majority (51.6%) of the respondents from the other question (Q21b) felt that there was a low information processing. The high information processing needs by hospitals has also been found by (Chau and Tam (2000)). The results

therefore give mixed results about the level of information processing. The findings is in line with the study by (Chau and Tam (2000), who showed that organizational slack in large hospitals may be a determinant of information systems adoption and that services at the hospitals is related to the adoption of administrative information system.

Table 38: Organizational communication for DHIS users

Variable name		DHIS Users responses								
		Level of data demand/information/communication								
Sub-Variable		Statistics	None	Very low	Low	Average	High	Very High	Total	
Size of the health facility	Organization communication	Channel	Frequency	0	5	81	5	26	7	124
			Percent	0	4.0	65.3	4.0	21.0	5.6	100
	Leadership	Frequency	0	2	62	11	43	6	124	
		Percent	0	1.6	50.0	8.9	34.7	4.8	100	

Organizational communications was also defined by two questions; Q21c and Q21g representing proper communication channel and presence of coordination/leadership in the facility. Each of the questions was categorized into six categories with none, very low, low, average, high and very high representing none / N/A, Strongly disagree, Disagree, Neutral, Agree and Strongly Agree respectively. Organizational communication and channels of organization communication together with good leadership in place and can allow employees to have a perceived ease of use of health information system or develop attitude towards health information system as explained by Technological Acceptance Model (TAM) theory of technology acceptance and adoption. The result shows that majority of the respondents in each question (65.3% and 50.0% for Q21c and Q21g respectively) felt that there was low organizational communications in the health facilities. The low organizational processing could be a hindrance to the effectiveness in utilization of DHIS in health facilities.

Table 39: Correlating size of health facility and utilization of DHIS for DHIS users

		Size of facility	Utilization of DHIS
Size of facility	Pearson Correlation	1	.809**
	Sig. (2-tailed)		.000
	N	122	122
Utilization of DHIS	Pearson Correlation	.809**	1
	Sig. (2-tailed)	.000	
	N	122	124

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

Table 39 shows correlation matrix between variables size of the health facility and utilization of DHIS. It also indicates values for Pearson correlations, Sig. (2-tailed) and number of samples (N) in each variable. It also shows whether the correlation values are significant or not. The results above shows that size of the health facility was highly, positively and significantly correlated to utilization of DHIS (0.809). The high positive and significant correlations value therefore shows that size of the health facility is a high contributor to the utilization of DHIS in health facilities in Nyakach Sub-County. In addition, positive results for the size of health facility could mean that the environment in the health facilities is good and has enabled employees to achieve the perceived ease of use of DHIS, perceived usefulness or developed a positive attitude towards health information system as explained by Technological Acceptance Model (TAM) theory of technology acceptance and adoption.

Table 40: Coordination of health information for DHIS users

				DHIS Users responses						
Variable name			Statistics	Level of decision making/planning/coordination						
Sub-Variable				None	Very low	Low	Average	High	Very High	Total
Utilization of DHIS	Coordination	Advice	Frequency	0	11	54	23	27	9	124
			Percent	0.0	8.9	43.5	18.5	21.8	7.3	100
	Opinion	n	Frequency	1	0	73	6	31	13	124
			Percent	0.8	0.0	58.9	4.8	25.0	10.5	100

Size of health facility determines utilization of DHIS especially as it relates to coordination of health information and health services by health facilities. This brings in the need to relate size of health facility to coordination. Table 40 shows the results of the sub-variable decision making under the dependent variable utilization of DHIS. Coordination was defined by two questions Q24d and Q24g representing advice to managers and respect of employee's opinion by management. Each of the questions was categorized into six categories with none, very low, low, average, high and very high representing none / N/A, Strongly disagree, Disagree, Neutral, Agree and Strongly Agree respectively.

Coordination whereby employees can give advice to managers and employee's opinion being respected by the managers, can allow employees to have a perceived ease of use of health information system or perceived usefulness of health information system as explained by Technological Acceptance Model (TAM) theory of technology acceptance and adoption. The results show that majority of the respondents in each question (43.5% and 58.9% for Q24d and Q24g respectively) felt that there was low level of coordination in the health facilities. The low level of coordination could be a hindrance to the effectiveness in utilization of DHIS in health facilities.

4.5.2 Size of Health Facility for DHIS Managers

Size of health facility refers to the categories of the health facilities from small clinics to large hospitals. It also looks at staffing levels and services available. Size of health facility was divided into data demand, information processing and organization sub-variables. Questions were asked during the interview to capture each sub variable above, data demand Q20, Q21d and Q21e, information processing captured by Q21a and Q21b, and organizational communication captured by Q21c and Q21f (see Appendix III). The results of the questions/sub-variables are given in the Tables' 41-45. The Tables shows the main variable and sub-variables being measured and their corresponding frequency and percent values as per ordinal/likert scale.

Table 41: Data demand for DHIS managers

			DHIS Managers responses							
Variable name		Level of data demand/information/communication								
	Sub-Variable	Statistics	None	Very low	Low	Average	High	Very High	Total	
Size of the facility	Data demand	Level	Frequency	2	0	0	4	7	7	20
			Percent	10.0	0	0	20.0	35.0	35.0	100
	Decision	Frequency	0	0	1	0	9	10	20	
		Percent	0	0	5.0	0	45.0	50.0	100	
	Planning	Frequency	0	1	1	6	5	7	20	
		Percent	0	5.0	5.0	30.0	25.0	35.0	100	

Each of the questions describing data demand for DHIS managers was categorized into six categories with none, very low, low, average, high and very high representing none / N/A, Strongly disagree, Disagree, Neutral, Agree and Strongly Agree respectively. Data demand in terms of level of data demand, demand for DHIS information for decision making and for planning purposes, can allow managers to realize the perceived usefulness of information system as explained by Technological Acceptance Model (TAM) theory of technology acceptance and adoption. The results show that majority of the respondents in each question (35.0%, 50.0% and 35.0% for Q20, Q21d and Q21e respectively) under data demand there was a feeling that there was high data demand. The results therefore indicate that there is high data demand in health facilities in Nyakach Sub-County. This data demand should be able to drive the utilization of DHIS in health facilities.

Table 42: Information processing for DHIS managers

			DHIS Managers responses							
Variable name			Level of data demand/information/communication							
	Sub-Variable	Statistics	None	Very low	Low	Average	High	Very High	Total	
Size of the facility	Information processing	System	Frequency	0	4	1	5	5	5	20
			Percent	0	20.0	5.0	25.0	25.0	25.0	100
	Health	Frequency	0	2	4	3	8	3	20	
		Percent	0	10.0	20.0	15.0	40.0	15.0	100	

Information processing was represented by two questions; Q21a and Q21b each categorized into six categories with none, very low, low, average, high and very high representing none / N/A, Strongly disagree, Disagree, Neutral, Agree and Strongly Agree respectively. Information processing in terms of a system being in place for information processing and DHIS being integrated into employee’s daily work, can allow managers to have a perceived ease of use of health information system as explained by Technological Acceptance Model (TAM) theory of technology acceptance and adoption. The results shows that majority (75.0%) of the respondents in one question (Q21a) felt that there was average – very high information processing while majority (40.0%) of the respondents from the other question (Q21b) felt that there was a low information processing. The results therefore give mixed results about the level of information processing.

Table 43: Organizational communication for DHIS managers

			DHIS Managers responses							
Variable name			Level of data demand/information/communication							
	Sub-Variable	Statistics	None	Very low	Low	Average	High	Very High	Total	
Size of the facility	Organization communication	Channel	Frequency	0	0	6	3	7	4	20
			Percent	0	0	30.0	15.0	35.0	20.0	100
	Leadership	Frequency	0	2	3	4	5	6	20	
		Percent	0	10.0	15.0	20.0	25.0	30.0	100	

Organization communications was also defined by two questions; Q21c and Q21f representing proper communication channel and presence of conducive environment where there is good coordination/leadership in the facility. Each of the questions was categorized into six categories with none, very low, low, average, high and very high representing none / N/A, Strongly disagree, Disagree, Neutral, Agree and Strongly Agree respectively. Organizational communication in terms of proper channels of communication and good leadership can allow managers to have a perceived ease of use of health information system or develop attitude towards health information system as explained by Technological Acceptance Model (TAM) theory of technology acceptance and adoption. The results shows that majority of the respondents in one question (Q21c) had high organizational communication (35.0%) while majority (30.0%) of the other question (Q21f) indicated that there was very high organization communication. The high and very high organizational processing could be a motivation to the effectiveness in utilization of DHIS in health facilities.

Table 44: Correlating size of health facility and utilization of DHIS for DHIS managers

		Size of health facility	Utilization of DHIS
Size of health facility	Pearson	1	.462*
	Correlation		
	Sig. (2-tailed)		.040
	N	20	20
Utilization of DHIS	Pearson	.462*	1
	Correlation		
	Sig. (2-tailed)	.040	
	N	20	20

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

Table 44 shows correlation matrix between variables size of the health facility and utilization of DHIS. It also indicates values for Pearson correlations, Sig. (2-tailed) and number of samples (N) in each variable. It also shows whether the correlation values are significant or not. The correlation result above shows that size of the health facility was positively and significantly correlated to utilization of DHIS (0.462). The positive and significant correlations value therefore shows that size of the health facility is a major contributor to the utilization of DHIS in health facilities in Nyakach Sub-County. In addition, positive results for the size of health facility could mean that the environment in the health facilities is good

and has enabled employees to achieve the perceived ease of use of health information system, perceived usefulness or developed a positive attitude towards health information system as explained by Technological Acceptance Model (TAM) theory of technology acceptance and adoption.

Table 45: Coordination of health information for DHIS managers

			DHIS Managers responses							
Variable name			Level of decision making/planning/coordination							
Sub-Variable		Statistics	None	Very low	Low	Average	High	Very High	Total	
Utilization of DHIS	Coordination	DHS	Frequency	0	0	2	3	8	7	20
			Percent	0	0	10.0	15.0	40.0	35.0	100
	SCHMT	Frequency	0	0	1	2	9	8	20	
		Percent	0	0	5.0	10.0	45.0	40.0	100	

Size of health facility determines utilization of DHIS especially as it relates to coordination of health information and health services by health facilities. This brings in the need to relate size of health facility to coordination. Table 45 shows the results of the sub-variable decision making under the dependent variable utilization of DHIS. Coordination was defined by two questions Q27g and Q27h representing coordination of DHIS at facility level and Sub County Health Management Team (SCHMT) support. Each of the questions was categorized into six categories with none, very low, low, average, high and very high representing none / N/A, Strongly disagree, Disagree, Neutral, Agree and Strongly Agree respectively.

Coordination of DHIS at the facility level by the facility in charges with the support of SCHMT, can allow managers to have a perceived ease of use of health information system or perceived usefulness of health information system as explained by Technological Acceptance Model (TAM) theory of technology acceptance and adoption. The results show that majority of the respondents in each question (40.0% and 45.5% for Q27g and Q27h respectively) felt that there was high level of coordination in the health facilities in terms of proper DHIS coordination at the facility level and high support from SCHMT. The high level of coordination could be because of an environment that is conducive enough to effectively utilization of DHIS in health facilities.

CHAPTER FIVE

SUMMARY OF THE FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter provides the summary of the findings as defined by the themes from the research objectives. It also gives the study conclusions and recommendations based on the study findings.

5.2 Summary of the Findings

The study sought to understand how employee capacity, availability of funds and size of the health facility contributes or affects the utilization of the DHIS in health facilities in Nyakach Sub-Country in Kisumu County. The study looked at the above relationships at two levels, that is the employee and managerial levels. The study targeted 124 DHIS users and 20 DHIS managers within the sub-county with the questionnaire return rates being 100%.

On the respondent's demographics, majority of the respondents came from the dispensaries both for DHIS users and managers with 48.4% and 50% respectively. This is mainly due to their numerous numbers as the first level of health care in Kenya. In terms of gender, the majority of the respondents were female both for the users and managers at 63.7% and 60% respectively. In terms of age, majority of the DHIS users were between 20-29 years (55%), while that of the managers was 30-39 years (71.8%). The level of education for both the users and managers was diploma at 83.9% and 70.0% respectively. In terms of cadre, majority of the users were nurses (65.3%) and for managers being the nursing officer in-charge (65.0%). The duration of stay at the facility was that majority of the DHIS users had stayed in the facility for 2-4 years (58.9%) while majority of the managers had also stayed in the facility for 2-4 years (50.0%).

The demographics of the study respondents as described above, shows that age is a necessary requirement for the utilization of DHIS in health facilities. This includes a factor that majority of the respondents were young people who are more likely to embrace ICT than older people (Gordana, 2005). The results also shows that majority of the health care workers in the study had diploma certificate and are therefore more likely to embrace health information system (Gordana, 2005) since they already possess the required background knowledge for the effective utilization of DHIS in health facilities. In addition, majority of the respondents were nurses. Nurses are considered to be key decision makers within the

healthcare sector (Stefik & Heater, 1989) hence they may greatly influence utilization of DHIS in health facilities.

The first objective of the study was to determine how employee capacity influences utilization of DHIS. From the users perspective, the results was that majority of the users had not been trained on DHIS (78.2%), majority (65.3%) had no skills on DHIS and majority (50.0%) had low perception of the DHIS. On managers' side, majority of the managers (85.0%) had no training, majority (85.0%) had no skills on DHIS and majority (50.0%) had high perception of DHIS. Correlation between employee capacity and utilization of DHIS has a negative and significant correlations value (-0.479) for users and also a negative and insignificant correlation value (-0.349) for managers. From the figures above it can be observed that the employee capacity is the major hindrance to the utilization of DHIS. Inadequate employee capacity and especially lack of training and skills could mean that health care workers in Nyakach Sub-County have not achieved the perceived ease of use of health information system or perceived usefulness of health information system as explained by Technological Acceptance Model (TAM) theory of technology acceptance and adoption.

To develop employee capacity, it is very important that health care workers undergo training on DHIS. Such trainings should be properly organized to benefit both users and managers of DHIS. Such trainings have great effect on how well they use the system both for their daily work as well as in generation of information that is relevant for decision making (Jasperson, *et al.*, 2005). However, the study results shows that there has been minimal or no training of the health care workers in Nyakach Sub-County.

Training results in understanding of indicators and data quality (Littlejohns, *et al.*, 2003) hence health care workers with training on DHIS indicators are more likely to record accurate and complete data that would encourage data use. Training results into DHIS usage, continuous usage of DHIS results into skills that encourage both DHIS usage and quality health services. The challenges could even be made more difficult by the fact that some managers in charge of health facilities are in some cases not aware of the role of health information system and how it can help them in their daily work (Galbraith, 1974).

The second objective was to establish how availability of funds influences utilization of DHIS. From the users perspective, the results was that majority of the users felt that there were low number of staff to effectively handle DHIS (57.3%), majority (59.7%) felt that there was low funding to the facility to effectively run the DHIS and majority (62.1%) also

felt that there were low infrastructure to effectively handle DHIS. On managers' side, majority of the managers felt that there were low number of staff to effectively handle DHIS (30.0%), majority (35.0%) felt that there was low funding to the facility to effectively run the DHIS and majority (35.0%) felt that there was averagely adequate infrastructure to effectively handle DHIS. Correlations between employee capacity and utilization of DHIS returned a positive and significant correlations value (0.415) for users and also a low positive and insignificant correlation value (0.181) for managers. From the figures above it can be observed that the availability of funds is also the hindrance to the utilization of DHIS. Lack of adequate funds could mean that health care workers in Nyakach Sub-County have not achieved the perceived ease of use of health information system because of challenges arising when funds are inadequate.

According to Jaspersen, *et al.* (2005), attaining the use of DHIS at optimal levels, especially at health facilities, is very closely related to availability of funding to help in acquiring various resources including computing and internet infrastructure, data collection tool, adequate staffing levels and training. Lack of funds determines DHIS infrastructure which is majorly caused by lack of resources (Omar & Charimari, 2005). Hence availability of funds and resources hugely influences utilization of DHIS in health facilities as seen in this study results.

Availability of funds can influence both the implementation and utilization of health information systems in health facilities (Dieleman *et al.*, (2003). In addition, inadequate infrastructural resources or contextual differences in terms of access to infrastructural resources can greatly affect utilization of DHIS in health facilities (Mengiste, 2010; Karuri, *et al.*, 2014). The above factors determine resource capacity to conduct data quality assessment and data analysis in the county health offices and health facilities, and system accessibility (RBHS, *et al.*, 2012). Therefore, inadequate funds in health facilities in Nyakach Sub-County, limits the utilization of DHIS and reduce effectiveness of healthcare services and management of these health facilities.

The third objective was to assess the extent to which the size of health facility influences utilization of DHIS. From the users perspective, the results were that majority of the users indicated that there was high level of data demand (54.0%, 59.7% and 62.1% for the three questioned used to measure data demand). In terms of information processing, there was a

mixture of results with one indicator/question indicating that there was high level of information processing (68.5%) while the other indicators/questions giving a low level of information processing (51.6%). On organizational communication, majority of the users indicated in the two indicators/questions that there was low level of organizational communication (65.3% and 50.0% respectively).

On the other hand, from the managers perspective, the results was that majority of the managers indicated that there was very high level of data demand (35.0%, 50.0% and 35.0% for the three questions used to measure data demand). In terms of information processing, there was a mixture of results with one indicator/question indicating that there was either average or high and very high level of information processing (25.0%) while the other indicators/questions giving a high level of information processing (40.0%). On organizational communication, majority of the managers in one indicator/question indicated that there was high level of organization communication (35.0%) while in the other indicator/question; majority (30.0%) indicated that there was very high level of organizational communication in the facility.

Correlation between size of health facility and utilization of DHIS returned a high positive and significant correlations value (0.809) for users and also a positive and significant correlation value (0.462) for managers. From the figures above it can be observed that the size of the facility is one of the major contribution/positive factor to the utilization of DHIS. High level of positive and significant results for the size of health facility could mean that the environment in the health facilities in Nyakach Sub-County is good and has enabled employees and managers to achieve the perceived ease of use of DHIS. In addition, they have also found it usefulness and developed a positive attitude towards its use.

The above results indicates that DHIS users and DHIS managers in health facilities in Nyakach Sub-County understands, use and see the need of DHIS and have thereby created a demand for it. However, for the demand to be created, the managers needs to understand what users need to effectively utilize the system (Rahimi, *et al.*, 2009), outline to users and make them understand the reasons for implementation from the outset (Littlejohns, *et al.*, 2003). These are some of the things that might have been taken into effect by SCHMT, MOH and donor when rolling out DHIS in Nyakach Sub-County resulting in the above results. In addition, it seems that challenges such as inadequate proactive leadership and information ownership at various levels, in addition to the unmet demand for data (Karuri, *et al.*, 2014)

are being addressed. It also seems that there is good support from the facility and other stakeholders in performing HMIS activities in terms of checking data quality, analysis and use of information both at Sub-County office and health facility levels (RBHS, *et al.*, 2012).

5.3 Conclusions

The first objective of the study was to determine how employee capacity influences utilization of DHIS in health facilities in Nyakach Sub-County. From the study findings we can conclude that employee capacity limit the utilization of DHIS in the health facilities in Nyakach Sub-County. Areas of employee capacity that seems to limit the utilization of DHIS are lack of trainings and skills for both the DHIS users and managers. The study results showed that majority of the DHIS users and managers had no training or skills on DHIS hence the urgent need for capacity building of both the DHIS users and managers.

The second objective of the study was to establish how availability of funds influences utilization of DHIS in health facilities in Nyakach Sub-County. From the study findings we can conclude that the currently available funds to the health facilities are insufficient hence it limits the utilization of DHIS in health facilities in Nyakach Sub-County. Availability of funds determines the number of staffs employed, money/funds to run and maintain DHIS and purchase of infrastructure that supports DHIS. From the study results, both the users and managers agree that there is inadequate staff, inadequate funding and inadequate infrastructures to effectively handle DHIS in health facilities in Nyakach Sub-County. The results therefore indicate the need for more staff, more funding and putting up of infrastructures that are needed for the smooth running of DHIS in health facilities in Nyakach Sub-County.

The third objective of the study was to assess the extent to which size of health facility influence utilization of DHIS in health facilities in Nyakach Sub-County. From the study findings we can conclude that size of health facility greatly encourages the utilization of DHIS in health facilities in Nyakach Sub-County. The results show that there is high data demand, high information processing and high organizational communication, components that are key and needed for effective utilization of DHIS. Therefore, it seems that the health facilities are ready and well-structured/organized for the effective utilization of DHIS.

In conclusion, it is evident from the study findings that the limiting factors to the utilization of DHIS in health facilities in Nyakach Sub-County are employee capacity and availability of funds. The two factors are closely related in that employee capacity could be due to

availability of funds and availability of funds without adequate employee capacity does not amount to much when it comes to the utilization of DHIS in health facilities. Therefore the researcher would like to contribute to the literature by arguing that when such studies are done on health information systems such as DHIS, it is important to integrate employee capacity and availability of funds to form a single component or variable. The above proposal is likely to give more sense and in-depth in such studies as the integration results in dual view.

5.4 Recommendations

Based on the study findings, the researcher would like to make the following recommendations.

1. The findings highlight inadequate employee capacity both for the DHIS users and managers. Therefore, there should be capacity building of both the users and managers to ensure that they are fully trained on DHIS. The trainings should also be continuous and the users and managers updated more frequently on any new updates. In addition, users and managers should be mentored to develop skills on DHIS. The mentorship should be done by SCHMT and donors who support DHIS in health facilities. Since both the users and managers have good perception about DHIS, this should be encouraged and maintained. The facilities management should ensure that this is maintained at all times.
2. Secondly, the authorities and ministries should employ more staff to the facilities to effectively run health services and other related services such as DHIS. The employing authorities such as ministry of health, county governments and donors should look into ways of solving the understaffing in these health facilities. The facility in-charges should also seek to obtain more funding to the health facilities. They can do this by seeking funds from the government, county governments and others donors such as NGOs. With more funds to the health facility, there should be an increased utilization of DHIS in these facilities. In addition, utilization of DHIS cannot be successful when there is no adequate infrastructure in place to support it. Infrastructure such as internet access, computers, electricity, stationery among others, needs to be available and adequate. Therefore, the facilities should ensure such infrastructures are in place.

3. Thirdly, factors that constitute to size of the health facilities should be maintained and encouraged by the facility managers, Sub-Country Health Management Team, government, donors and other stakeholders. This is because size of the health facilities factors such as; data demand, information processing and organization communications greatly increase utilization of DHIS in health facilities.

5.5 Suggestions for Further Studies

1. Further studies should focus more on unearthing the training needs and gaps for both the DHIS users and managers. Such studies should be in-depth focused studies, which could be individual or facility based.
2. Secondly, further studies should focus on the availability of resources which should focus on the staffing at the health facilities, the amount of funds the facility gets or is able to access and the level of the infrastructure in facility. These are to be studied in detail and how they relate or contribute to the DHIS utilization in health facilities.
3. Thirdly, there should be studies to focus on how employees at different training/skill levels utilize the DHIS. This is because from this study it seems that untrained/unskilled staff are utilizing DHIS hence the need to know the level, effectiveness and efficiency of such utilization.

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APPENDICES

APPENDIX I: LETTER OF TRANSMITTAL

DOROTHY OSIYO,
P.O BOX 483-30400,
HOMA-BAY.

TO;
THE MEDICAL OFFICER OF HEALTH,
NYAKACH SUB-COUNTY,
KISUMU COUNTY.

RE: DATA COLLECTION FOR RESEARCH STUDY

I am a student of the University of Nairobi, taking a Master of Arts Degree in Project Planning and Management. I am currently in the stage of conducting my research work on the Influence of Institutional Capacity on Utilization of District Health Information System (A case study of health facilities in Nyakach Sub-County).

The study will involve data collection from the health care workers who uses DHIS and the Health facility in-charges who are the DHIS managers. I hereby make a request to your office to grant me permission to carry out the study within the Sub-County.

Yours faithfully,

Dorothy Osiyo-L50/77547/2015

ID. NO. 23787557

APPENDIX II: QUESTIONNAIRE FOR DHIS USERS

The purpose of this questionnaire is to collect information on the influence of institutional capacity on utilization of District Health Information System by the users in health facilities within Nyakach Sub-County, Kenya. The information gathered will be strictly for academic purpose.

Instructions

- i. Kindly answer all the questions.
- ii. Kindly tick [] or provide required information for questions.

SECTION A: Identification (To be completed by the interviewer)

Q1. Name of health facility

Q2. Type of health facility

- Referral/County hospital
- Sub-County Hospital
- Health Centre
- Dispensary

SECTION B: Background Information

Q3. Gender of the respondent

- Male
- Female

Q4. Age group of the respondent

- 10 – 19 years
- 20 – 29 years
- 30 – 39 years
- 40 and above

Q5. What is your highest level of education?

- Master's degree
- Bachelor's degree
- Diploma
- Certificate

Others (specify)

Q6. Cadre of the health care worker

Clinical Officer

Nurse

Health Records Officer

Data Clerk

Q7. How long have you been working in this facility?

Less than 1 year

2 – 4 years

5 – 7 years

8 – 10 years

Over 10 years

SECTION C: Employee Capacity and DHIS Utilization

Q8. What is your responsibility in relation to the DHIS? (**Tick all that apply**)

Updating registers

Report generation

Data entry

Data analysis

Management and decision making

Others (specify)

Q9. How long have you been working/using DHIS in this facility?

Less than 1 year

2 – 4 years

5 – 7 years

8 – 10 years

Over 10 years

Q10a. Have you undergone any training on DHIS?

Yes

No

Q10b. If **YES** above, in which areas of DHIS have you been trained on? (**Tick all that apply**)

- Data entry into DHIS
- Data analysis using DHIS
- Generation of graphs/charts
- Use of data for decision making
- Use of data for health management
- Others (specify)

Q11. Through training/experience, which skills have you acquired or developed in relation to DHIS? (**Tick all that apply**)

- Skills in health registers
- Skills in health record keeping
- Skills in data entry into DHIS
- Skills in data analysis using DHIS
- Skills in generation of graphs/charts
- Skills in use of data for decision making
- Skills in use of data for health management
- Others (specify)

Q12. In your own opinion, kindly give your response to the following questions.

Q12a. DHIS is easily accessible

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

Q12b. DHIS is easy to learn and use

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

Q12c. DHIS is an important tool for decision making.

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

Q12d. I feel comfortable and proficient enough to use DHIS effectively

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

Q12e. Use of DHIS has made my daily work easier.

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

Q12f. It is more efficient to use DHIS than the other ordinary data methods.

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

Q12g. I see the integration of DHIS into my daily work as a burden.

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

Q12h. Facility managers are supportive and open to discussions for the purposes of decision making and future planning.

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

Q13. What are some of the challenges you face while using DHIS?

.....

Q14. In your opinion, how can the challenges be solved or minimized?

.....

SECTION D: Availability of Funds and DHIS Utilization

Q15a. Is there DHIS application in this facility?

- Yes
- No

Q15b. If **YES** above, where does the funding come from? (**Tick all that apply**)

- Government of Kenya (GoK)
- Non-Governmental Organizations (NGOs)
- Religious Organizations
- Others partners
- Others (specify)

Q16. In your own opinion, kindly give your response to the following questions.

Q16a. There are enough personnel to effectively manage DHIS at this facility.

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

Q16b. There are adequate resources (computers, internet, stationery and equipment) to effectively enable the smooth running of DHIS.

- Strongly disagree

- Disagree
- Neutral
- Agree
- Strongly agree

Q16c. There is enough funding to ensure the smooth running of DHIS in this facility.

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

Q16d. As a staff, I am well motivated in using DHIS as a complementary tool to aid my work.

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

Q17. What are some of the challenges that you as an employee face in relation to resources/funds to support DHIS?

.....

Q18. In your opinion, how can the above challenges be solved or minimized?

.....

SECTION E: Size of the Health Facility and DHIS Utilization.

Q19a. Is there data demand in/from this facility?

- Yes
- No

Q19b. If **YES** above, where does the demand come from? (**Tick all that apply**)

- Sub-County Health Management Team (SCHMT)
- Non-Governmental Organizations (NGOs)
- Other partners/stakeholders

- Facility/department managers
- Facility health care workers
- Others (specify)

Q20. What is the level of data demand from you or your facility?

- Huge demand
- Adequate demand
- Average
- Less demand
- No demand at all

Q21. In your own opinion, kindly give your response to the following questions.

Q21a. In this department/facility, there is a system in place for information processing for effective DHIS use.

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

Q21b. There is high level of health data information processing using DHIS.

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

Q21c. There is proper communication channel in this department/facility to address any DHIS issue.

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

Q21d. There is demand for DHIS information in decision making.

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

Q21e. There is demand for DHIS information for planning purposes by various departments.

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

Q21f. There is conducive environment for use and dissemination of DHIS information.

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

Q21g. There is good coordination and leadership in relation to use of DHIS.

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

Q22. What are some of the data demands that you/your department/facility have not met?

.....

Q23. In your opinion, how can the above demands be met by you/department/facility?

.....

SECTION F: Utilization of DHIS.

Q24. In your own opinion, kindly give your response to the following questions.

Q24a. I use the information from DHIS for client's basic health care.

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

Q24b. I use the information from the DHIS to make health related interventions.

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

Q24c. I use the information from DHIS for public health decision.

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

Q24d. I use the information from DHIS to advice my managers.

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

Q24e. The facility uses the information from DHIS for human resources management and work allocations.

- Strongly disagree
- Disagree

- Neutral
- Agree
- Strongly agree

Q24f. The facility uses the information from DHIS for making decisions for purchases of equipment and medical supplies.

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

Q24g. My opinion on the use of DHIS for management and future plans are respected by facility managers.

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

Q25. What are some of your thoughts on what promotes/discourages use and update of DHIS for management and decision making by the health providers?

.....

.....

Q26. What is your general opinion on DHIS?

.....

Thank you very much for taking your time to answer the questionnaire. God bless you!

APPENDIX III: QUESTIONNAIRE FOR DHIS MANAGERS

Introduction

The purpose of this questionnaire is to collect information on the influence of institutional capacity on utilization of District Health Information System by the managers in health facilities within Nyakach Sub-County, Kenya. The information gathered will be strictly for academic purpose.

Instructions

- i. Kindly answer all the questions.
- ii. Kindly tick [] or provide required information for questions.

SECTION A: Identification (To be completed by the interviewer)

Q1. Name of health facility

Q2. Type of health facility

- Referral/County hospital
- Sub-County Hospital
- Health Centre
- Dispensary

SECTION B: Background Information

Q3. Gender of the respondent

- Male
- Female

Q4. Age group of the respondent

- 10 – 19 years
- 20 – 29 years
- 30 – 39 years
- 40 and above

Q5. What is your highest level of education?

- Master's degree
- Bachelor's degree
- Diploma
- Certificate
- Others (specify)

Q6. Cadre/Position of the health care worker

- Medical Superintendent
- Clinical Officer In-charge
- Nursing Officer In-charge
- Others (Specify)

Q7. How long have you been working in this facility?

- Less than 1 year
- 2 – 4 years
- 5 – 7 years
- 8 – 10 years
- Over 10 years

SECTION C: Employee Capacity and DHIS Utilization

Q8. What is the purpose/goal for the use of DHIS in this facility? (**Tick all that apply**)

- Patient management
- Decision making
- health management
- Planning
- Others (specify)

Q9. How long have you been working/using DHIS in this facility?

- Less than 1 year
- 2 – 4 years
- 5 – 7 years
- 8 – 10 years
- Over 10 years

Q10a. Are there training programs for DHIS users within your facility?

Yes

No

Q10b. If **YES** how frequent?

Monthly

Quarterly

Bi-annually

Annually

Others (specify)

Q11. What skills and knowledge have you been targeting in your trainings (**Tick all that apply**)

Data entry into DHIS

Data analysis using DHIS

Generation of graphs/charts

Use of data for decision making

Use of data for health management

Others (specify)

Q12. In your own opinion, kindly give your response to the following questions.

Q12a. DHIS is easily accessible

Strongly disagree

Disagree

Neutral

Agree

Strongly agree

Q12b. As a manager DHIS provides me with support for decision making.

Strongly disagree

Disagree

Neutral

Agree

Strongly agree

Q12c. Use of DHIS has made my work as a manager easier.

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

Q12d. It is more efficient to use DHIS than other ordinary data methods.

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

Q12e. It is fully satisfied with the use and service of the DHIS system.

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

Q13. What are some of the challenges you face as a manager while using DHIS?

.....
.....

Q14. In your opinion, how can the challenges be solved or minimized?

.....

SECTION D: Availability of Funds and DHIS Utilization

Q15. What are the sources of funding for the DHIS system in your facility? (**Tick all that apply**)

- Government of Kenya (GoK)
- Non-Governmental Organizations (NGOs)
- Religious Organizations
- Others partners
- Others (specify)

Q16. In your own opinion, kindly give your response to the following questions.

Q16a. There are enough personnel to effectively manage/handle DHIS at this facility.

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

Q16b. There are adequate resources (computers, internet, stationery and equipment) to effectively enable the smooth running of DHIS.

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

Q16c. The facility is able to access enough resources/funding to run DHIS effectively.

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

Q16d. My staffs are well motivated to use DHIS as a complementary tool to aid their work.

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

Q17. What are some of the challenges that employees/facility faces in relation to resources/funds to support DHIS?

.....
.....

Q18. In your opinion, how can the above challenges be solved or minimized?

.....

SECTION E: Size of the Health Facility and DHIS Utilization.

Q19a. Is there data demand in/from this facility?

Yes

No

Q19b. If **YES** above, where does the demand come from? (**Tick all that apply**)

Sub-County Health Management Team (SCHMT)

Non-Governmental Organizations (NGOs)

Other partners/stakeholders

Facility/department managers

Facility health care workers

Others (specify)

Q20. What is the level of data demand from your facility?

Huge demand

Adequate demand

Average

Less demand

No demand at all

Q21. In your own opinion, kindly give your response to the following questions.

Q21a. DHIS is integrated into employee's daily work.

Strongly disagree

Disagree

Neutral

Agree

Strongly agree

Q21b. There is system in place for information processing for effective DHIS use.

Strongly disagree

Disagree

Neutral

- Agree
- Strongly agree

Q21c. There is proper communication channel in this facility to address any DHIS issue.

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

Q21d. There is demand for DHIS information for decision making.

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

Q21e. There is demand for DHIS information for planning purposes.

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

Q21f. There is conducive environment for DHIS utilization in this facility.

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

Q22. What are some of the data demands that your facility has not met?

.....
.....

Q23. In your opinion, how can the above data demands be met by your facility?

.....

SECTION F: Utilization of DHIS.

Q24. Please mention the specific types of decisions, plans or coordination that you make with the information from DHIS?

.....
.....

Q25a. Does your facility have a dedicated team/group to discuss the information obtained from DHIS?

Yes

No

Q25b. If **YES** above, how often does this team meet for discussions?

Daily

Weekly

Bi-monthly

Monthly

Quarterly

Annually

Q25c. What are the issues discussed in these meetings? (**Tick all that apply**)

Data quality

Discussion for decision making

Future planning

Updates/Training

Discussion of challenges of DHIS

Review of employee/facility performance

Others (specify)

Q26a. Is the information derived from DHIS disseminated to other staff/stakeholders?

Yes

No

Q26b. If **YES** above, what are the groups that this information is disseminated to? (**Tick all that apply**)

- Other employees
- Other departments
- Facility management
- Donors (GoK, NGOs, partners etc)
- Local government administration
- The political leaders
- Community/community leaders
- Clients
- Others (specify)

Q27. In your own opinion, kindly give your response to the following questions.

Q27a. The facility use information from DHIS for client's basic health care.

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

Q27b. The facility uses information from the DHIS to make health related interventions.

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

Q27c. The facility uses information from DHIS for public health decision.

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

Q27d. The facility uses the information from DHIS to advice the donors.

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

Q27e. The facility uses the information from DHIS for human resources management and work allocations.

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

Q27f. The facility uses the information from DHIS for making decisions for purchases of equipment and medical supplies.

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

Q27g. DHIS is well coordinated both at the facility and county/district level.

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

Q27h. SCHMT is supportive and open to discussions for the purposes of decision making and future planning.

- Strongly disagree
- Disagree
- Neutral

- Agree
- Strongly agree

Q27i. SCHMT usually joins us in the meetings to discuss to inform decisions making and future plans.

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

Q27j. The facility opinions on use of DHIS for management and future plans are respected and worked on by the SCHMT.

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

Q28. What are some of your thoughts on what promotes/discourages use and update of DHIS for management and decision making by health facility managers?

.....
.....

Q29. As a facility manager, what is your general opinion on DHIS?

.....
.....

Thank you very much for taking your time to answer the questionnaire. God bless you!

APPENDIX IV: UNIVERSITY LETTER OF INTRODUCTION



UNIVERSITY OF NAIROBI
COLLEGE OF EDUCATION AND EXTERNAL STUDIES
SCHOOL OF CONTINUING AND DISTANCE EDUCATION
KISUMU CAMPUS

The Secretary
National Council for Science and Technology
P.O Box 30623-00100
NAIROBI, KENYA

14th August, 2016

Dear Sir/Madam,

RE: OSIYO DOROTHY - REG NO: L50/77547/2015

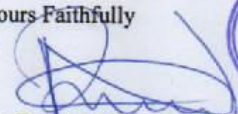
This is to inform you that **Osiyo Dorothy** named above is a student in the University of Nairobi, College of Education and External Studies, School of Continuing and Distance Education, Kisumu Campus.

The purpose of this letter is to inform you that **Dorothy** has successfully completed her Masters Course work and Examinations in the programme, has developed a Research Proposal and submitted before the School Board of Examiners which he successfully defended and made corrections as required by the School Board of Examiners.

The research title approved by the School Board of Examiners is: *"Influence of Institutional Capacity on Utilization of District Health Information System: A Case Study of Health Facilities in Nyakach Sub-County, Kenya"*. The Project is part of the pre-requisite of the course and therefore, we would appreciate if the student is issued with a research permit to enable her collect data and write a report. Research project reflect integration of practice and demonstrate writing skills and publishing ability. It also demonstrates the learners' readiness to advance knowledge and practice in the world of business.

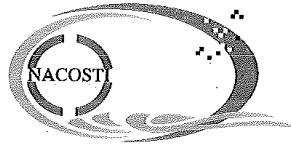
We hope to receive positive response so that the student can move to the field to collect data as soon as he gets the permit.

Yours Faithfully


Dr. Raphael O. Nyonje, PhD
SENIOR LECTURER & RESIDENT LECTURER
DEPARTMENT OF EXTRA-MURAL STUDIES
KISUMU CAMPUS



APPENDIX V: RESEARCH AUTHORIZATION LETTER



NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY AND INNOVATION

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2241349, 3310571, 2219420
Fax: +254-20-318245, 318249
Email: dg@nacosti.go.ke
Website: www.nacosti.go.ke
When replying Please quote

9th Floor, Utalii House
Uhuru Highway
P. O. Box 30623-00100
NAIROBI-KENYA

Ref: No.

Date:

NACOSTI/P/16/21052/13773

27th September, 2016


Dorothy Osiyo
University of Nairobi
P.O. Box 30197-00100
NAIROBI.

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on *“Influence of institutional capacity on utilization of District Health Information System: A case of health facilities in Nyakach Sub-County, Kenya,”* I am pleased to inform you that you have been authorized to undertake research in **Kisumu County** for the period ending **27th September, 2017**.

You are advised to report to **the County Commissioner, the County Director of Education and the County Director of Health Services, Kisumu County** before embarking on the research project.

On completion of the research, you are expected to submit **two hard copies and one soft copy in pdf** of the research report/thesis to our office.


BONIFACE WANYAMA
FOR: DIRECTOR-GENERAL/CEO

Copy to:

The County Commissioner
Kisumu County.

The County Director of Education
Kisumu County.

National Commission for Science, Technology And Innovation Is ISO 9001:2008 Certified

APPENDIX VII: ANTI-PLAGIARISM REPORT

Turnitin Originality Report

INFLUENCE OF INSTITUTIONAL CAPACITY ON UTILIZATION OF DISTRICT HEALTH INFORMATION SYSTEM: by Dorothy Osiyo

From Project Planning and management (Project Planning and management)

- Processed on 16-Nov-2016 07:48 EAT
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