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## **Influence of Management of Information Systems’ Capacity Utilisation on Healthcare Facilities. A Case of Healthcare Facilities in Homabay Sub-County, Kenya**

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### **Abstract**

The study aimed at determining the influence of institutional capacity on utilization of Sub-County Health Information System in health facilities in Homabay sub-county. Utilization of Health Information System was raising concerns both locally and globally. This is in view of the role of health managers to take up proactive leadership in demand for and use of data for decision making. The system also helps decision makers to detect and control emerging and endemic health problems, monitor progress towards health goals and promote equity if well utilized. Low utilization of health information system by healthcare workers in health facilities was identified as a challenge in many developing countries including Kenya. This problem was identified in Homabay Sub-County where the health care workers did not fully utilize information from Sub-county Health Information System despite enormous resources that are provided to help in its implementation. The specific objectives were, firstly to determine how employee capacity influence utilization of district health information system in health facilities in Homabay sub-county. Secondly to establish how availability of funds influence utilization of district health information system in health facilities in Homabay sub-county. Thirdly to assess the extent to which size of healthcare facility influence utilization of district health information system in health facilities in Homabay sub-county. The study was conducted in Homabay sub-county, between July and September 2019.

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It adopted descriptive research design where both quantitative and qualitative data was collected using questionnaires from a total of 20 District Health Information System managers and 124 users in public health facilities in Homabay 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 analyzed using both descriptive and inferential statistics where Pearson-Product Moment Correlation was applied to be able to determine the relationship between institutional capacity and utilization of Sub-county Health Information System in Homabay 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 Sub-county health information system, with values being significant for users (-0.479) and insignificant for managers (-0.349). Inadequate employee capacity was mainly due to lack of trainings and skills while availability of funds was mainly due to inadequate staff and lack of infrastructures to support and encourage the use of Sub-county Health Information System. In view of the findings of the study, the researcher gave recommendations. This was necessary as it ensured that both managers had the capacity and skills to effectively utilize Sub-county Health Information System in their facilities. The study came up with suggestions for further studies on the subject so that the findings in this study can be confirmed and verified by many more studies.

**Keywords:** Influence; Institutional Capacity; Utilization; Health Information Systems; Employee Capacity; Infrastructure; and; Healthcare Workers.

## **1. Introduction**

The study aimed at determining the influence of management of information system capacity on utilization of healthcare facilities in Kenya and it sought to determine how employee capacity influence management of information systems' capacity on utilization of healthcare facilities and establish how availability of funds influence management of information systems' capacity in the country. World Health Organization (WHO) defines health information management systems as an integrated effort to collect, process, report and use health information and knowledge to influence policy making, programme action and research as observed by WHO I [1]. Health Information Systems (HIS) automate the patient administrative functions such as patient profile information, scheduling of appointments, billing and the clinical care functions such as clinical notes, computerised prescriptions, online laboratory results, digital radiological imaging and ultimately has the capability of eliminating paper processes within the clinical setting. This aims to create a more cost effective, resource efficient, informed health care service that can be accessed by all. Health information system also helps to generate the production of information to inform decision making, improve performance, and improve health operations and health status. Kimani and his colleague in[2], also points out that health information system helps decision makers to detect and control emerging and endemic health problems, monitor progress towards health goals, and promote 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 that empowers all those who contribute to and benefit from health information as observed by the authors in [3]. However, despite its intended usefulness, many challenges have been experienced in both the implementation and its use thereby denying the health systems 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 as noted by Rahimi and his colleagues in [4]. In Vietnam the motivation of health care workers to use such system was related to low salaries and difficult working conditions as observed by the authors in [5]. On the positive note though, a study in Thailand found that community health centres exhibited a high degree of health information system acceptance and use, a factor which was tied to previous experiences, intention to use the system, and facilitating conditions according to the authors in [6]. Most health workers in developing countries associate information system with filling endless registers by names and addresses of patients, compiling information on disease every week or month, and sending reports to the next level without adequate utilization and feedback. In a study in South Africa, primary and secondary clinics are often located in rural areas with poor road networks and interrupted services such as electricity and water the users did not understand the reasons for implementation from the outset and underestimation of the complexity of healthcare tasks as noted by authors in [7]. Still in South Africa, Garrib and his colleagues in [8], identified delays in submission of data due to non-delivery of forms, poor understanding of indicators, unreliable data quality, and lack of information use by managers as major challenges. In Ethiopia, information quality and use remain weak within the health sector, particularly at the peripheral levels of districts and health facilities which have primary responsibilities for operational management. As a result, most managerial decisions are being made without evidence, resulting in the failure of many health programs, perhaps because the information system in the country is cumbersome and fragmented. In Malawi, the reasons for inadequate use or non-use of health information was identified as lack of skills to access information systems and interpret results, resource constrains, leadership issues, and lack of holistic vision/approach for management of data Chaulagai according to authors in [9]. In Liberia, there was limited capacity to perform data quality assurance and data analysis in the county health offices and health facilities. In addition, data quality checks had not been institutionalized and that data quality varied from facility to facility depending on supporting partners. There were also behavioral and organizational determinants to use of health information system as observed by the author in [10]. Kenya like many other global and african countries has adopted health information system to help realize Kenyans Vision 2030 of health provision of providing equitable and affordable quality health services to all Kenyans. To accomplish this, the first Medium Term Plan 2008-2012 of the Vision 2030 identified the need to strengthen the national health information systems to enable them provide adequate information for monitoring health goals and empowering individuals and communities with timely and understandable information on health Karuri and his colleagues 2014. According to Nutley and his colleagues in [11], 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. 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 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. These are the gaps that this study sought to fill.

### ***1.1 Statement of the Problem***

Health information system should enable health facilities and health care workers to easily access health information and make informed decision, planning and coordinating health services in order to improve health service delivery. Due to this, the process of accessing Health Information System for report generation should be simple and straightforward enough that can be easily understood by all the users. Usually, health facilities use Health information system 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 thereby helping to improve the quality of service delivery. 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 health care workers do not fully utilize information from Health information system despite enormous resources that have been provided by the Kenyan government, Non-governmental organizations and stakeholders to help in the implementation of health information system. The researcher therefore looked at the institutional capacity of the public health facilities and how it affects utilization of Health information system. This was 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 its utilization for decision making, planning and coordination of health services. Effective utilization of Health information system is expected to improve the institutional efficiency and effectiveness hence better management and coordination of health service delivery.

### ***1.2 Objectives of the study***

The study was guided by the following objectives:

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

### ***1.3 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 sub-county health information system in health

facilities in Homabay Sub County?

2. How does availability of funds influence utilization of Sub-county health information system in health facilities in Homabay Sub County?
3. To what extent does the size of healthcare facility influence utilization of sub-county health information system in health facilities in Homabay Sub County?

#### **1.4 Research Design**

The researcher adopted descriptive research design. Descriptive research design provides an accurate description or picture of the status or characteristics of a situation or phenomenon by describing the variables that exist in a given situation and sometimes, it describes the relationship that exists among variables as noted by authors in [12]. Through this research design, the researcher was able to unearth the influence of institutional capacity on utilization of Healthcare Information System in decision making, planning and coordination of health information in healthcare facilities.

#### **1.5 Target Population**

The target population for this research was twenty (20) health facility managers and 148 health care workers that directly use DHIS and were working in public health facilities within Homabay Sub County. The managers included officers who were 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 Homabay 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 are considered to be non-users of DHIS. The researcher determined the proportion of the sample that was needed in order 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;

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

$n_0$  = representative sample size

$Z^2$  = abscissa of the normal curve that cuts off an area  $\alpha$  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 will be reduced significantly to enable the sample size to provide more information for a sample population. Therefore equation (1) was adjusted to equation (2) below by the author in [13].

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

$n_0$  = representative sample size

$n$  = sample size

$N$  = population size

The above equation therefore was 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 Homabay Sub-County. In total, there was 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.

**1.6 Sampling Procedures**

The researcher adopted stratified random sampling method to select the respondents since the population is heterogeneous constituting different cadres of healthcare workers who directly use DHIS which are the strata in this case as shown in Table 2 above. After this, each strata was homogeneous and to get representation from each strata, a simple random sampling method was used.

**1.7 Data Analysis Techniques**

Data analysis involves closely related operations which are performed with the purpose of summarizing collected data and organizing these in a manner that they answer research questions according to the author in [14]. The data was analyzed using descriptive survey design. The design was appropriate for this study because it involves the description analysis interpretation of circumstances prevailing at the time of study. The primary data collected was edited for completeness and consistency, serialized and stored according to the date of the interview, ID-code of the informant, and questionnaire category (DHIS users or Managers). Since the data obtained from the questionnaires were both in the form of the closed and open ended questions, there was need to code the open ended questions to enable them to be analyzed using the available statistical package. The coding process was done as follows; the data in the open ended questions was summarized according to the

arising themes and views as it related to the research question or study framework. Care was taken to ensure that summaries included the key points that emerged from the raw data obtained from the open ended questions in the questionnaires. The summaries were then coded, that was the process of attaching labels to lines of text so that the researcher could group and compare similar or related piece of information. The coded data was sorted by compiling similarly coded blocks of text from different sources into a single response. Thereafter, the sorted codes was indexed, through a process that generated a word list comprising all the substantive words used per open ended questions in the questionnaire and the entire survey. The indexed data from the codes and data from the closed questions was then entered into a statistical computer program before analysis. The statistical package to be used is SPSS version 22.0 for windows. Descriptive statistics, frequencies, correlation was used to perform the statistical analysis. The results from the statistical analysis was then used to summarize the findings and outline the study recommendations. Data and findings was presented using descriptive statistics, frequency tables, percentages and correlation tables.

### ***1.8 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 Homabay Sub-Country. County. The study looked at the above relationships at two levels, that is the employee and managerial level. 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 as observed by the author in [15]. 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 as observed by the same author [15] 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 as noted by Heater and his colleagues in [16] hence they may greatly influence utilization of DHIS in health facilities. 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. To develop employee capacity, it is very important that health care workers undergo training on DHIS. Such trainings should be packaged properly depending on the cadre of users who are targeted. Such trainings contributes directly to how well they use the system both for their routine work as well as in generation of information products that can aid in relevant decision making according to Jaspersen and his colleagues in [17]. However, the study results shows that there has been minimal or no training of the health care workers in Homabay Sub-County. Results in understanding of indicators and data quality as noted by Littlejohns and his colleagues in [7] 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 more complicated by the fact that the some managers in charge of health facilities are in some cases not fully aware of the role of health information system and how it can assist them in their day to day work as observed by the author in [18]. According to the authors in [17], getting the use of DHIS at optimal levels, especially at health facilities, is very closely linked to availability of funding to support 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 as observed by the authors in [19]. 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 according to the authors in [5]. In addition, inadequate infrastructural resources or contextual differences in terms of access to infrastructural resources can greatly affect utilization of DHIS in health facilities as observed by the author in [20], and also the authors in [21]. The above factors determine resource capacity to perform data quality assurance and data analysis in the county health offices and health facilities, and system accessibility as observed by the authors in [10]. Therefore, inadequate funds in health facilities in Homabay 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 was 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 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. Correlations 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. Most of the respondents 98.7% reported that it was necessary to collect data. Their opinions and views towards information use were that; 96.7% of the respondents felt that information is key in decision making, 73.9% of them felt that staff competence and skills was key in information use, others felt that positive attitude towards information motivates information use (66.7%). Management guidance and leadership (53.6), Proper resources (50.3%) and confidence to use information 51.0% were also found to be major motivators of information use. This indicated a positive attitude among the sub county managers towards information use. The study also found out that 97.4% of the managers felt that information use was important in their area of work and that 77.8% used information for planning, 71.2% to monitor their work, 61.4% to evaluate their programs, 60.1% to monitor program output. This implies that utilization of information for decision making among program managers in Malindi Sub County is on-going though there is still room for improvement. A correlation analysis using Pearson coefficient correlation was conducted at 95% and 99% confidence intervals and 5% and 1% significance level and with a 2-tailed test. A significant positive correlation between staff competence/skills, positive attitude and management leadership and guidance to use information was noted by a Pearson value of (0.371) and (0.287). Lack of incentives to use information and nature of work at (0.239) values. From the study findings, it is evident that the limiting factor to the utilization of DHIS in health facilities is employee capacity and availability of funds. On employee capacity, the two areas that seems to limit the utilization of DHIS is lack of training and lack of skills for both the users and managers. It can be observed that majority of the users and managers are not trained and lack required skills to effectively run the DHIS. The second issue that limit the utilization of DHIS in health facilities is availability of funds. Both the users and managers agree that the numbers of staff are inadequate to effectively handle DHIS in health facilities. In addition, the users and managers agree that there is inadequate funding to the facilities. It seems the current funding level is not enough to ensure the smooth running of DHIS in the health facilities. On infrastructure the users feel that they are not enough while the managers were of the opinion that they are averagely enough. Despite the lack of the agreement between the users and managers on this, the results indicate that the currently available infrastructures are not enough to effectively run DHIS in these health facilities.

## **2. Conclusions**

From the study findings, it is evident that the limiting factor to the utilization of DHIS in health facilities is employee capacity and availability of funds. On employee capacity, the two areas that seems to limit the utilization of DHIS in lack of training and lack of skills for both the users and managers. It can be observed that majority of the users and managers are not trained and lack required skills to effectively run the DHIS. The second issue that limit the utilization of DHIS in health facilities is availability of funds. Both the users and managers agree that the numbers of staff are inadequate to effectively handle DHIS in health facilities. In addition, the users and managers agree that there is inadequate funding to the facilities. It seems the current funding level is not enough to ensure the smooth running of DHIS in the health facilities. On infrastructure the users feel that they are not enough while the managers were of the opinion that they are averagely enough. Despite the lack of the agreement between the users and managers on this, the results indicate that the currently available infrastructures are not enough to effectively run DHIS in these health facilities.

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