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ABSTRACT

Purpose: This was a study based on Health Information Systems pillar. The study sought to explore factors related to quality data which influence health information utilization in making decision among healthcare managers in Mombasa County.

Methodology: This was a Descriptive Survey Study design where desired data was obtained from selected respondents by semi-structured questionnaires. The research targeted a total of 303 healthcare managers in Mombasa County which comprised of 21 County Health Management Team (CHMT) members, 56 Sub-county Health Management Team (SCHMT) members from the four sub-counties, 43 facility In-Charges from the 43 public health facilities and 183 Heads of Departments (HODs). A sample size of 91 healthcare managers was used in the study. This was 30% of the target population and were randomly selected. A response rate of 98.9% was achieved. Descriptive and Inferential analysis was done. Data was analyzed with SPSS version 23.

Findings: Results revealed that quality data factors ($\beta_4 = 0.298$; $t = 4.079$; $p < 0.01$) were significant predictors of health information utilization in making decision among healthcare managers in Mombasa County. These results imply that improvement in these variables (data accuracy, completeness and timeliness) will enhance health information utilization. How these variables are accomplished influence the level of health information utilization in making decision.

Unique contribution to theory, practice and policy: When the study recommendations are implemented, there will be assured quality data which will assist in coming up with the design of disease prevention, interventions and to monitor and evaluate the progress made on the measures put in place. By doing so, the study will have validated the theory of Evidence Based Health Information System by Carbone, (2009), on which the study was anchored. Quality data is, therefore, not only crucial in securing health status description, service coverage, and performance, but also inspires confidence in the HIS among healthcare managers. The study recommends that the MOH introduces HMIS as a subject in the pre-service curriculum of all healthcare cadres in order to improve HIS. Mombasa County Government should ensure that quality data is generated (with regards to accuracy, completeness and timeliness) at all levels of the health systems for purposes of accountability and more importantly its utility to improve healthcare programs, to survive and prosper in the current dynamic healthcare environment.

Key words: *Data, Decision Making, Health Information System, Health Information Utilization, Healthcare Managers*

INTRODUCTION

Background of the Study

Health Information System (HIS) is very important for health systems strengthening. It is a data collection system specifically designed to support planning, management and decision making in health facilities and organizations (WHO, 2008). Reliable and timely health information is essential for policy development, proper health management, evidence-based decision-making, rational use of resources, and the monitoring and evaluation of the public health situation, health care delivery and outcomes (WHO, 2019). Utility of health information not only keeps individuals and members of the public informed and empowered to make the right decisions concerning their well-being but also influences public health policy and decision making; advances skills in developing products and tools to promote, maintain, protect and restore health (WHO, 2014). Therefore, using information to make decisions is very important for continuous improvement in health system.

HIS is a core pillar in strengthening health systems and its availability enables healthcare managers to use it in their daily managerial duties. Reliable information on service delivery and other key indicators is, therefore, very valuable for all healthcare managers. According to WHO, (2014), health care providers in various healthcare organizations, globally, cannot identify problems and prioritize needs, neither can they monitor and evaluate the impact of interventions they put in place. As a result, there are increased running costs of health facilities due to recurrence of diseases, and inconsistencies in patients' management. A properly functioning HIS gets the right information into the right hands at the right time, enabling policymakers, managers, and individual service providers to make informed choices on decisions ranging from patient care to national budgets (MEASURE Evaluation, 2015).

Health information utilization in Africa ranges between 10 to 56% (Shiferaw *et al.,* 2017). There is lack of capacity to use data, across Africa, in such a way that healthcare managers can evaluate the impacts of changes they put in place, (Nyamtema, 2010). In this context, important health decisions depend on disease estimates and burden, besides political opportunism, donor demands, and occasionally on infrequently repeated national studies like Demographic Health Survey (DHS) which are insensitive to changes occurring over a shorter period. According to Shiferaw *et al.,* (2017), decision making in health should depend on reliable data as well as human and financial resources which have been invested to improve HIS.

Data collected must be processed, disseminated, and utilized to make managerial decisions that are aimed at improving health outcomes (WHO, 2014). According to Ministry of Medical Services (MOMS) and Ministry of Public Health and Sanitation (MOPHS), (2010), in Kenya, data collected at the health facilities are sent to the higher levels in the health systems. This means that data collectors are not the final users of the generated information at facility level. Health information

utilization enables free movement of healthcare workers, for instance to conduct community dialogue and outreaches, thus enhancing patients' access to health care
(Karuri *et al.,* 2012). This facilitates abundant and timely communication among stakeholders in a health system thus improving service delivery. According to Omole, (2015), a key component of HIS is surveillance in public health whose main focus is identifying problems and taking corrective measures promptly, for instance during epidemics.

Statement of the Problem

In Kenya, data collected at the health facilities are sent to the higher levels in the health systems (MOMS & MOPHS, 2010). At the same time, out of all the data that is collected, only 7% is analyzed, hence the ministry is swamped in data but not information. Even though resources have been allocated for data collection, it is not used to track progress and intervention impact hence high costs to patients, increased workload to health care providers and low performance on health indicators (MOMS & MOPHS, 2010).

Having acknowledged the critical role played by a functional HIS, in 2010 Kenya's HIS Division at the Ministry of Health was mandated to overhaul the existing system and replace it with the web-based District Health Information Software (DHIS2). DHIS2 was designed to facilitate generation, analysis and dissemination of quality health information for informed decision making (MOH, 2014). Despite introduction of DHIS2, recent evidence has shown very low levels of data demand, access and use by the targeted users in Kenya (Ekirapa *et al.,* 2013). Related findings in a study conducted in Kiambu, Kitui and Mombasa by Kawila and OdhiamboOtieno, (2019), revealed that healthcare workers were unable to access information or reports from the sub-county in time and that information for returning patients was not easily accessible to all service providers simultaneously. At the same time, information on the cost of health care was not readily available in the HMIS. HIS fundamental principle demands that statistical data and health information be made liberal and readily accessible as a "Public good" and in a timely manner, and also promotes use of existing data (MOH, 2009).

In Mombasa County there is reliance on HIS reports to monitor and evaluate programs and to carry out certain interventions. For instance, at Coast General Teaching and Referral Hospital (CGTRH), demand for use of available information generated by health workers and managers in making decision are at a minimum level (Nzomo, 2017). According to Nzomo, (2017), data quality audits reports done at CGTRH showed incomplete data that is underutilized in making decision and what influences information utilization is not known. The same sentiments are expressed by Kenya Coordinating Mechanism, (2015), which stated that underutilization of health information for decision making has resulted in lack of efficiency and effectiveness in provision of healthcare services in Mombasa County. This is also an under-researched area in Mombasa County since there is little or no documented evidence and literature to show how health information is being utilized in making decision among healthcare managers, specifically.

LITERATURE REVIEW

Quality data has been described by looking at four dimensions, that is, completeness, timeliness, relevance and accuracy (Aqil & Lippeveld, 2013). According to Aqil and Lippeveld, (2013), data quality dimensions are dependent on each other and that there are correlations existing among them. This means that if one dimension is considered more important than the others, for one reason or the other, then the choice of favoring it may imply negative impacts on the others. Data is considered relevant if it contains only the information needed by management. Data is considered complete if it contains all the required data sets with regards to the proportion of reporting facilities in a county or sub-county. Data is considered accurate if it measures what it is intended to measure. Accurate data minimizes error to a negligible level. Accuracy implies that data is certified free of error. In order to be useful, data must be accurate (Aqil & Lippeveld, 2013). Just as Omole, (2015), points out, if motivational measures concerning data management are not addressed, there will be a negative impact on data quality thus causing major problems to healthcare organizations.

The foundation of all health systems is quality data from healthcare institutions' HIS (Nutley & Reynolds, 2013). Data is always in reports and is not adequately utilized for managerial activities. There is a widespread problem related to quality data and relying on poor or uncertain quality data leads to decisions that are ineffective (Njoka, 2015). According to Njoka, (2015), it is not easy to achieve quality data in third world countries. Additionally, data from the third world countries are often not complete and sometimes this is occasioned by inadequate managerial support.

In 2014, accuracy of summary data and District Health Information System (DHIS) data was generally low in Kenya compared to the source documents and this was aggravated by several systemic issues which included lack of standardized tools, lack of indicator definitions, lack of SOPs, governance issues and unclear roles and responsibilities (MOH, 2014). According to MOH, (2014), there was only a slight improvement in accuracy of DHIS data against summary sheets despite having qualified Health Records and Information Officers (HRIOs) keying in this data. This was occasioned by lack of aggregation instructions and multiple data generation sites.

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

Empirical studies conducted in Africa point to the fact that data completeness is a serious concern (Mate *et al.,* 2009). For instance, in a study conducted in South Africa on challenges in preventing Mother-to-Child Transmission of HIV showed huge variations in the completeness of data reporting for selected Prevention of Mother-To-Child Transmission (PMTCT) data elements.

Results from the health facilities showed that the data were complete at only 50.3%. At the same time, in a study conducted in 22 hospitals found out that quality data was not delivered by the HMIS and this was attributed to constraints in data quality support supervision, lack of Information Technology (IT) application, lack of integration and lack of resources (Kihuba *et al*., 2014).

To reduce clinical and medical errors, quality data must always be in place (Carbone, 2009). Quality data is needed to come up with the design of disease prevention, interventions and to monitor and evaluate the progress made on the measures put in place. Additionally, healthcare organizations should ensure there is accuracy of data for purposes of accountability and, more importantly, its utility to improve healthcare programs, to survive and prosper in the current dynamic healthcare environment. Quality data is, therefore, not only crucial in securing health status description, service coverage, and performance, but also inspires confidence in the HIS among healthcare managers. The better the quality of data, the more people will have confidence in it, value it, and use it as a tool in making decision hence improving the overall health of the general population (Teklegiorgis *et al.*, 2016).

Reviewed literature referred to data accuracy, data completeness and data timeliness as dimensions to data quality. However, the study established that these are measurable indicators that have significant and positive influence in making decision among healthcare managers in Mombasa County. Approximately 36.2% of the variation in health information utilization in making decision among healthcare managers in Mombasa County was explained by changes in data accuracy, completeness and data timeliness. This implies that improving quality of health information through increased data accuracy, completeness and data timeliness would contribute to increased health information utilization in making decision among healthcare managers thus improving health systems' performance not only in Mombasa County but also beyond.

METHODOLOGY

The study was conducted in Mombasa County. It has four sub-counties; Mvita, Likoni, Kisauni/Nyali, and Changamwe/Jomvu. The population is served by 43 public health facilities; one County Referral Hospital, three Sub-County Hospitals, 14 Health Centres and 25 Dispensaries.

This was a Descriptive Survey Study design where desired data was obtained from selected respondents by questionnaires. The research targeted a total of 303 healthcare managers in Mombasa County which comprises 21 CHMT members, 56 SCHMT members from the four sub-counties, 43 facility In-Charges from the 43 public health facilities and 183 HODs. As recommended by Mugenda & Mugenda, (2003), in a study population that is less than 10,000 a sample size of between 10 and 30% is a good representation of the target population. Therefore, a sample size of 91 healthcare managers was used in the study, as shown in table 1 below.

Table 1: Sampling Matrix

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

Sampling Technique

The healthcare managers were categorized into four homogenous strata (County Health Management Team, Sub-County Health Management Team, Facility In-Charges and Heads of Departments). Multi-stage selection was applied to sample hospitals. A simple random selection to sample health centers and dispensaries was done while Purposive sampling was done to sample the three Sub-County Hospitals (Tudor, Likoni and Portreitz) and Coast General Teaching and Referral Hospital. Being higher level facilities the number of healthcare managers with varied cadres are more than those in the primary level facilities.
Respondents for the study from different health facilities in the county and departments within the facilities were selected through simple random sampling. At every level, 30% of the managers were selected. A sampling frame was developed by listing the positions of the healthcare managers at every level. Pieces of paper with the written positions were put inside a box mixed then taken out without replacing them back.

Instrumentation

Data was collected using semi-structured questionnaires. This was developed based on the study objective. Responses to the questionnaires were measured on an ordinal Likert Scale for the closed ended questions. The scale had a width of 0.8 [(5-1) ÷ 5].

Validity and Reliability

Validity was established through adequate coverage of the topic under study by the questionnaires and ensuring the instruments contained a representative sample that could be inferred to the rest of the population. Cronbach's alpha was used to measure internal reliability of results. A Cronbach's reliability coefficient of 0.70 or higher was reliable. The study obtained a reliability coefficient of 0.783 which was deemed sufficient to confirm the reliability of the questionnaire.

Data Analysis

Results were analyzed using SPSS statistical software, version 23. Descriptive analysis was conducted to summarize the results on the study and inferential analysis was performed to explain the influence of independent variables on dependent variable. Frequencies/percentages of the responses were obtained and mean and standard deviation calculated to rate their views. Results were presented using tables, charts and graphs, followed by interpretations and discussions. Significance level was set at $p<0.05$. Results were presented in graphs, charts and tables.

RESULTS AND DISCUSSIONS

Socio-Demographics of Healthcare Managers

As shown in Table 2 below, 63% of the managers were female while 27% were male. This means that majority of the healthcare managers in Mombasa County were female. These results coincide with WHO, (2008), which pointed out that in health sector, women are over 75% of the health workforce making them the backbone of healthcare service delivery. 42% of the managers were between the age of 31-40 years. This means that Mombasa County had young generation healthcare managers. 42% of the managers had a bachelors' degree. Professionally, 24% were nurses, which was the majority. This means that majority of the managers were nurses. This finding supports MOH, (2017), report that in Kenya, nurses provide the bulk of health workforce. The study findings indicated that 47% of the managers had served in their current managerial positions for between six months to five years. This means that majority of the managers had utmost 5 years working experience as healthcare managers. According to Thakur, (2015), demographic characteristics affect employee performance by evoking differential expectations among them and should, therefore, be seen not as a hindrance but utilized profitably by employers. However, according to Transparency International-Kenya, (2011), sociodemographic characteristics do not influence data use in making decision. This implies that information utilization in making decision is determined by other factors, not one's sociodemographic characteristics.

Table 2: Socio-Demographics of Healthcare managers

Demographic Characteristics	n (%)
Gender	
Male	30(33%)
Female	60(67%)

Age of the managers	
21- 30	15(17%)
31- 40	38(42%)
41- 50	21(23%)
Above 50	16(18%)
Education level	
Certificate	5(6%)
Diploma	36(40%)
Higher Diploma	6(7%)
Bachelors Degree	38(42%)
Post Graduate Diploma	1(1%)
Masters and above	4(4%)
Professional Background	
Social work and Counseling	3(3%)
Radiology	3(3%)
Public Health	5(6%)
Physical Therapy	1(1%)
Pharmacy	7(7%)
Nutrition and Dietetics	3(3%)
Nursing	22(24%)
Medicine and Surgery	7(8%)
Medical Laboratory	13(14%)
Health records and Information	5(6%)
Dentistry	4(4%)
Clinical Medicine	13(14%)
Human Resource, Health Administration and Finance	4(4%)
Duration of Service in Current Position	
Less than 6 months	9(10%)
6 months – 5 years	42(47%)
5 - 10 years	21(23%)
Above 10 years	18(20%)

Factors related to Quality Data

Quality data factors considered in this study included data completeness, data accuracy and data timeliness. Results indicated that healthcare managers in Mombasa County received data that was generated by healthcare providers (69%). This means that other healthcare workers like doctors,

clinical officers, nurses, among others, other than Health Records and Information Officers (HRIOs) were the ones responsible for generating data. This is in agreement with findings by WHO, (2014), which established that data is collected by the healthcare providers and this has led to an increased workload on the healthcare providers and data collectors hence a compromised quality of healthcare hence limited ability to improve health outcomes. The same sentiments were echoed by Gopalan *et al.,* (2013), that data is collected by healthcare providers who already have other tasks to perform and they consider this as an extra work which prevents them from their primary duty. This implies that healthcare providers concentrate more on providing clinical care and less emphasis is put on data collection.

Healthcare managers in Mombasa County were required to respond to statements concerning factors related to quality data. The managers' responses were rated on a five-point Likert scale; where 1 depicts Strongly Disagree (SD), 2 depicts Disagree (D), 3 depicts Neutral (N), 4 depicts Agree (A) and 5 depicts Strongly Agree (SA). Frequencies/percentages of the responses were obtained and average and standard deviation calculated to rate their views. The scale had a width of 0.8 [(5-1) ÷ 5], therefore, a score between 1 to 1.8 depicted Strongly Disagree, between 1.81 to 2.6 Disagree, between 2.61 to 3.4 Neutral, between 3.41 to 4.2 Agree, and between 4.21 to 5 Strongly Agree. However, during data analysis, Strongly Disagree and Disagree responses were merged to depict Disagree while Agree and Strongly Agree responses were merged to depict Agree. This was done across the study findings.

As shown in Table 3 below, results show that 65% of the managers agreed (with a mean of 3.59 and a standard deviation of 0.967) that reported data summarized the work of all the departments. This is so because all departments generated and compiled their data which was submitted to a central point where the whole facility data was compiled before being disseminated to other levels. However, the managers had varied opinions on whether the reported data sufficiently covered all their health information needs for decision making and whether or not the reported data includes all the necessary dataset reports. This means that an almost equal number of managers agreed that they got incomplete data. Data is considered complete if it contains all the required data sets with regards to the proportion of reporting facilities in a county or sub-county (Aqil & Lippeveld, 2013). The study results agreed with Mate *et al.,* (2009), that empirical studies conducted in Africa point to the fact that data completeness is a serious concern and only 50.3% of the cases reported complete data. The results also indicated that 74% of the managers disagreed (with a mean of 2.2 and a standard deviation of 0.984) that routine health data was not relevant to their current data analysis and aggregation needs, and that the data/information they received added no value to their decision making due to inconsistencies (84% with a mean of 1.87 and a standard deviation of 0.925). This implies that the managers considered health data as important for their decision making and that there was value in data that is complete. Data is considered complete and is valuable if it contains all the required data sets with regards to the proportion of reporting facilities in a county or sub-county (Aqil & Lippeveld, 2013).

Table 3: Data Completeness

	N	SD	D	N	A	SA	Mean	Std. Dev.
Reported data sufficiently covers all my health information needs for decision making	89	0 0%	25 28%	25 28%	31 35%	8 9%	3.25	0.969
The reported data includes all the necessary dataset reports	88	4 5%	14 16%	24 27%	38 43%	8 9%	3.36	1.008
The reported data summarizes the work of all the departments	88	1 1%	15 17%	15 17%	45 51%	12 14%	3.59	0.967
Routine health data is not relevant to my current data analysis and aggregation needs	88	19 22%	46 52%	11 13%	10 11%	2 2%	2.2	0.984
The data/information I receive add no value to my decision making due to inconsistencies	87	33 38%	40 46%	8 9%	4 5%	2 2%	1.87	0.925

Results in Table 4 below indicate that 71% of the healthcare managers (with a mean of 3.63 and standard deviation of 1.038) agreed that they had encountered inaccurate data during decision making process. This means that the generated data was not accurate. Data is considered accurate if it measures what it is intended to measure and is certified free of error (Aqil and Lippeveld, 2013). At the same time, 69% of the managers agreed (with a mean of 3.72 and a standard deviation of 1.215) agreed that inaccurate data hindered them from routinely using health information to make decisions. These results concur with Njoka, (2015), who established that 89.7% of the respondents in his study agreed that they had encountered inaccurate data during decision making process. These results also concur with those from a study conducted in Kenya in 2014 by the division of Health Information Monitoring and Evaluation which concluded that data accuracy in summary reports and DHIS data when compared with the source document showed that accuracy was very low and several systemic problems were the contributing factors.

On the other hand, the managers' opinions were divided on whether or not they had relied on/used other data sources other than the Routine Health Information Systems (RHIS) to make decisions. This means that an almost equal number of the managers had made decisions from other sources other than relying on the RHIS. This supports assertions by Nyamtema, (2010), that lack of capacity to use data, across Africa, has resulted in important health decisions being made depending on disease estimates and burden, besides political opportunism, donor demands, and occasionally on infrequently repeated national studies like Demographic Health Survey (DHS). According to Shiferaw *et al.,* (2017), decision making in health should depend on reliable data as well as human and financial resources which have been invested to improve HIS. **Table 4: Data Accuracy**

	N	SD	D	N	A	SA	Mean	Std. Dev.
Inaccurate data hinders me from routinely using health information to make decisions	89	6 7%	12 13%	9 10%	36 40%	26 29%	3.72	1.215
As a manager I have encountered inaccurate data during decision making process	89	4 4%	12 13%	10 11%	50 56%	13 15%	3.63	1.038
I use all the information I receive to make my decisions regardless of their level of accuracy	88	10 11%	35 40%	24 27%	19 22%	0 0%	2.59	0.955
I have used/relied on other data sources other than RHIS to make decisions	87	4 5%	17 20%	25 29%	36 41%	5 6%	3.24	0.988

Table 5 below shows that 61% of the healthcare managers agreed (with a mean of 3.57 and a standard deviation of 1.102) that data reporting from various levels of the health systems was always according to the set national reporting timelines and 62% agreed that corrective measures were always taken within reasonable time to address data reporting issues. This means that data was always submitted to various levels in time as stipulated in the national guidelines. Similar results were obtained by Njoka, (2015), where 86.2% of the respondents agreed that data reporting from facilities were always on time.

Table 5: Data Timeliness

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

Linear regression results indicated that approximately 36.2% of the variation in health information utilization in making decision among healthcare managers in Mombasa County was explained by changes in data quality factors (data accuracy, completeness and data timeliness). Results are shown in Table 6 below.

Table 6: Regression Model Summary of Factors related to Quality Data on Health Information utilization in making decision

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.601[a]	.362	.339	.314

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

ANOVA test results shown in Table 7 below indicate that, at 95% confidence level, the regression model (data accuracy, completeness and data timeliness) was significant in predicting health information utilization in making decision among healthcare managers in Mombasa County.

Table 7: ANOVA of Factors related to Quality Data on Health Information utilization in making decision

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

a. Dependent Variable: Health Information utilization in making decision
b. Predictors: (Constant), Data Accuracy, Completeness of Data, Data Timeliness

Regression coefficients results shown in Table 8 below indicate that quality data factors had significant positive influence on health information utilization in making decision among healthcare managers in Mombasa County. This implies that improving the quality of health information through increased data accuracy, completeness and data timeliness would contribute to increased health information utilization in making decision among healthcare managers in Mombasa County.

Table 8: Coefficients of Factors related to Data Quality on Health Information utilization in making decision

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

a. Dependent Variable: Health Information utilization in making decision

These results support Teklegiorgis *et al.*, (2016), who reiterate that managers make accurate decisions when relevant, accurate and timely data is availed to them. The opposite is true with irrelevant information which impact negatively on an organization's performance. This means that data that is consistent, complete and availed in time is essential in making decision and other managerial activities. The foundation of all health systems is quality data from healthcare institutions' HIS (Nutley & Reynolds, 2013). Data quality is, therefore, important in ensuring that

health status is accurately described and at the same time exuding confidence in data use among healthcare managers (Teklegiorgis *et al.*, 2016). According to Teklegiorgis *et al.*, (2016), more people value and rely on data that is of assured quality thereby using it to make decision which eventually improve the overall performance of health systems. According to Carbone, (2009), quality data is needed to come up with the design of disease prevention, interventions and to monitor and evaluate the progress made on the measures put in place. Additionally, healthcare organizations should ensure there is quality data for purposes of accountability and, more importantly, its utility to improve healthcare programs, to survive and prosper in the current dynamic healthcare environment. This means that quality data is, therefore, not only crucial in securing health status description, service coverage, and performance, but also inspires confidence in the HIS among healthcare managers.

Pearson's correlation test was performed at a $p<0.05$ level of significance to assess relationship between health information utilization in making decision among healthcare managers in Mombasa County and factors related to data quality. Pearson's product moment correlation test results showed that factors related to data quality ($r = .556$, $p < 0.01$) had a significant and moderate positive correlation with information utilization among healthcare managers in Mombasa County.

Table 9: Product Moment Correlation Matrix

		X	Y
X	Pearson Correlation	1	
	Sig. (2-tailed)		
	N	90	
Y	Pearson Correlation	.556**	1
	Sig. (2-tailed)	.000	
	n	90	90

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

Where: X represents Factors related to Quality Data (Independent Variable)

Y represents Health Information utilization (Dependent Variable)

Health Information utilization in making decision

Healthcare managers were required to respond to statements concerning health information utilization in planning and performing various tasks. The managers' responses were scored on a five-point Likert scale as shown in Table 10 below. **Table 10: Health Information utilization in Planning**

	n	SD	D	N	A	SA	Mean	Std. Dev.
Formulation of Health Policies	90	0 0%	3 3%	27 30%	40 44%	20 22%	3.86	0.801
Ensure financial allocation/reallocation based on needs	89	4 5%	8 9%	13 15%	44 49%	20 23%	3.76	1.045
Develop strategies that ensure access to healthcare services	87	5 6%	5 6%	19 22%	43 49%	15 17%	3.67	1.019
Develop strategies for managing epidemics	88	5 6%	4 5%	26 30%	35 40%	18 20%	3.65	1.04
Design disease surveillance strategies	89	1 1%	0 0%	21 24%	60 67%	7 8%	3.81	0.619
Conduct health systems researches	89	1 1%	7 8%	69 78%	12 13%	0 0%	3.03	0.51
In recruitment and selection of human resource for health	90	2 2%	6 7%	35 39%	44 49%	3 3%	3.44	0.766
Medical supplies management	90	1 1%	24 27%	56 62%	7 8%	2 2%	2.83	0.675
Conduct training to staff based on their training needs	90	0 0%	10 11%	38 42%	40 44%	2 2%	3.38	0.712
Develop and implement staff retention strategies	90	0 0%	5 6%	70 78%	14 16%	1 1%	3.12	0.493

Empower individuals with timely relevant health information	90	0 0%	6 7%	77 86%	7 8%	0 0%	3.01	0.382

Results indicate that 66% of the healthcare managers agreed that health information was used in formulation of health policies. This supports assertions by Abajebel *et al.,* (2011), that healthcare managers should monitor and evaluate measures put in place to formulate and implement policies in order to come up with informed decisions that can achieve set health targets. 64% of the managers agreed that health information ensured financial allocation/reallocation was based on needs, developing strategies that ensured access to healthcare services (58%), developing strategies for managing epidemics (53%), designing disease surveillance strategies (67%), and in recruitment and selection of human resource for health (75%). These findings support those from a study done by Wekesa, (2014), where she reiterates that an effective HIS has multiple benefits and enables healthcare managers to do the following: Detecting and controlling emerging and endemic conditions; monitoring progress towards attainment of health targets; promoting equity in health; empowering individuals and communities with timely dissemination of health information; enhancing quality of services; strengthening evidence base for formulation of health policies; enabling innovation through research; improving governance and mobilizing and allocating resources and ensuring accountability in resource use. Even Omole, (2015), reiterates that a key component of HIS is surveillance in public health whose main focus is identifying problems and taking corrective measures promptly, for instance during epidemics.

However, a higher proportion of the managers neither agreed nor disagreed whether health information was being used in conducting health systems researches (78%), management of medical supplies (62%), conducting training to staff based on their training needs (42%), developing and implementing staff retention strategies (78%), and empowering individuals with timely relevant health information (86%).

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

Healthcare managers were required to respond to statements concerning health information utilization in monitoring and evaluating health systems' performance. The managers' responses were scored on a five-point Likert scale as shown in Table 11 below.

Table 11: Health Information utilization in Monitoring and Evaluation

	N	SD	D	N	A	SA	Mean	Std. Dev
Assess staffs' technical competency on HIS	87	4 5%	14 16%	24 28%	32 37%	13 15%	3.41	1.073
To assess staffs' performance on health service delivery	88	4 5%	7 8%	19 22%	47 53%	11 13%	3.61	0.964
To ensure health facilities' performance is based on health information	85	1 1%	7 8%	20 24%	44 52%	13 15%	3.72	0.868
To ensure patients' management is based on health information	90	5 6%	21 23%	32 36%	29 32%	3 3%	3.04	0.959
To ensure resource allocation/reallocation is based on health information	88	3 3%	4 5%	44 50%	32 36%	5 6%	3.36	0.805
To share best practices on the overall health systems performance	90	3 3%	10 11%	45 50%	31 34%	1 1%	3.19	0.777

Results indicate that 52% of the healthcare managers agreed that they used health information to assess staffs' technical competency on HIS, to assess staffs' performance on health service delivery (66%), and to ensure health facilities' performance was based on health information (67%). These findings are in compliance with Health Sector M&E Framework developed by the MOH to guide counties in developing their own HIS M&E plans and strategic guidelines (MOH, 2014). The framework states that data and information generated at all levels of the sector and from different sources will be shared, translated and applied for decision-making during routine monitoring, periodic sector performance review, planning, resource mobilization and allocation, accountability, designing disease-specific interventions, policy dialogue, review and development. It also outlines several reports and the data that should be presented in those reports, including the Annual Health Sector Performance Report (2013–2014), a report compiled and disseminated by the Division of

Health Informatics and M&E that provides health outcomes data, achievements against different health goals, and funding allocations for the past year.

However, a higher proportion of the managers neither agreed nor disagreed whether they used health information to ensure patients' management was based on health information (36%), to ensure resource allocation/reallocation is based on health information (50%), and to share best practices on the overall health systems' performance (50%).

Conclusion

It is evident from the study that data is collected by healthcare workers who at the same time are involved in clinical care to the patients. The collected data summarizes the work of all departments of a health system although the reported data does not sufficiently cover all the healthcare managers' information needs for decision making. The reported data does not also include all the necessary data sets.

It is also evident that data generated is not accurate and this hinders the healthcare managers from routinely using health information to make evidence-based decision making. Data reporting from various levels of the health system in Mombasa County is always according to the set national reporting time lines and measures are usually taken in time to address any data reporting issues.

Approximately 36.2% of the variation in health information utilization in making decision among healthcare managers in Mombasa County is explained by changes in data accuracy, completeness and data timeliness. These quality data factors are significant and have a positive influence in making decision among healthcare managers in Mombasa County. This implies that improving quality of health information through increased data accuracy, completeness and data timeliness would contribute to increased health information utilization in making decision among healthcare managers in Mombasa County.

Majority of healthcare managers in Mombasa County use health information health information in formulation of health policies; to ensure financial allocation/reallocation is based on needs; in developing strategies that ensure access to healthcare services; in developing strategies for managing epidemics; in designing disease surveillance strategies and in recruitment and selection of human resource for health. In monitoring and evaluation, the managers utilize health information to assess staffs' technical competency on HIS, to assess staffs' performance on health service delivery and to ensure health facilities' performance is based on health information.

Recommendations from the Study

1. The MOH should include HMIS as a subject in the pre-service curriculum for all healthcare cadres to ensure all healthcare workers are knowledgeable in HIS.
2. Mombasa County Government should develop and ensure consistent use of standardized tools for collecting data to streamline data gathering process.
3. Mombasa County Government should ensure that quality data is generated (with regards to accuracy, completeness and timeliness) at all levels of the health systems for purposes of accountability and more importantly, its utility to improve healthcare programs, to survive and prosper in the current dynamic healthcare environment.

Suggestion for further research

The factors considered in this study (data accuracy, data completeness and data timeliness) have a partial influence (36.2%) on health information utilization in making decision among healthcare managers in Mombasa County. Therefore, other studies should be carried out to focus on other factors influencing health information in making decision in order to improve HIS and facilitate proper prioritization of health needs, interventions and proper resource allocation.

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