Original Research Article

Use of routine health information for decision making among health care workers in Marsabit county, Kenya

Mohamed Asafa Aila*, Peter Kithuka

Department of The Health Management System and Informatics Kenyatta University, School of Public Health, Nairobi, Kenya

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*Correspondence:
Dr. Mohamed Asafa Aila,
E-mail: mohamed.aila@students.ku.ac.ke

ABSTRACT

Background: In Kenya today, public health facilities at different levels collect a large amount of routine health (RH) data. However, with the introduction of district health information software (DHIS2), recent evidence has shown low levels of data are used by the targeted stakeholders in Kenya. Therefore, study aims to examine the association of human resource and information technology factors associated with the frequent use of RH data in decision-making among health-workers in Marsabit county.

Methods: The study employed a cross-sectional design. Researchers purposively stratified 201 health workers by cadre, then probability proportionate sampling was applied to get the required number from every cadre. Both qualitative and quantitative data were collected and entered into the SPSS software, descriptive measurement and Chi square test were used to analyze the data.

Results: The majority (74%) of respondents had basic computer skills but 80% of respondent lacked training in health information management. The study found that training increases the likelihoods of healthcare workers utilizing RH data. The type of software (DHIS2 and MedBoss) in use had a significant association with the frequent use of RH data at a p (0.028<0.05).

Conclusions: The study revealed that the health facilities lacked ample IT accessories even though internet and electricity connectivity was not limited, however, RHI use was not optimal in health facilities. The study found that the majority of respondents lacked training in RH data implying that training may influence the overall use of the routine data. The study also observed that RH data were used for decision-making frequently for a range of management functions.

Keywords: Routine health information, Health Management Information System, Decision Making in Health System, Marsabit County Health facilities

INTRODUCTION

Strengthening health systems is a priority for global and national health agencies as a means of improving health outcomes. This is more so in today's world, where the global health context is becoming complex and in response, national health systems shifting from disease-specific responses to comprehensive health systems.[1] This comes as a consensus amongst the global community who assert that a systems approach is necessary for achieving better health outcomes and improving health-related developments.[2]

One of the WHO's six attributes of health system strengthening is health information. Improving the health systems and health outcomes depends on the quality of data from health information systems (HIS), which is central to health system management. It is the foundation of decision making in the other five blocks of the WHO framework.[3,4]

In Kenya, the health information system consists of RH data, public health surveillance, surveys, census, and vital records.[5] Significant human and monetary sources have been invested globally in the health information system focusing collection of RH service and surveillance data. However, the information generated from pursuits health records is hardly ever used at the local level by health managers to suitably inform decision making. As a result, health suffers from the reduced potential of evidence-based decision making and therefore, the system is less responsive to the priority health need of the population it serves. The utilization of health information needs to be strengthened at all levels of the system enhancing the culture and practice of "Data and information use for decision-making" and capacity building at all levels.[5]

RH information is fundamental in making informed decisions. However, there is a striking disconnect between the collection of data and the use of the same in making informed decisions, especially because collected data are now not even converted into valuable information.[6] In Kenya today, the management of the public health facilities at different levels are more concerned about the collection and reporting of health data through DHIS2 but little is known on how individual facilities analyze, report, and disseminate the same for use in making informed decisions at the facility level. Yet despite the introduction of DHIS2, recent evidence has shown very low levels of data demand and use by the targeted stakeholders in Kenya.[7]

Data accrued from the HIS can assist in making informed decisions and ultimately improve health outcomes. In today's world, many health care workers (HCWs) have become overwhelmed with gathering RH data as required by government policies and partners' demands that have grown exponentially. However, data are regularly not used in the formulating of a plan, identifying priorities, tracking progress, and making a knowledgeable decision. This is a massive opportunity because of fact that data are vital to the improvement of health outcomes and the decision-making process. Consequently, the global community has committed to beef up the quality, relevance, and comprehensiveness of the data to aid in making data-informed decisions.[6]

Lack of data sharing between the different units limits the effective policy decision making which is compounded by the lack of capacity by the facilities to conduct deeper analysis on the available raw data.[7] This is due to the lack of technical expertise and capacity of the staff to collect and merge data into meaningful reports. Marsabit county's integrated development plan (CIDP) identified gaps in health service provisions including; infrastructure, health management information system (HMIS), health workforce.[8] Therefore, the study assessed factors associated with the use of RH information for decision-making among HCWs in Marsabit county.

METHODS

The study employed a descriptive cross-sectional research design. The study purposively selected the two administrative units with 349 HCWs in Marsabit county. Using Fisher's exact finite population formula, 201 HCWs were selected to participate in the study. HCWs were stratified into respective professional cadres, then probability proportionate sampling was applied to get the required number from every cadre. Simple random sampling was used to select prospective respondents. Data were collected using a self-administered survey. Key informant interviews were conducted. An observation checklist was used to quantify equipment. Data were entered into SPSS software version 23 and analyzed using descriptive and Chi-square tests to determine the association.

RESULTS

The overall purpose of this study was to assess factors associated with the use of RH information for decision-making among HCWs. The analysis was done both descriptively and inferentially to meet the study's specific objectives which also guide the organization of this chapter.

The objectives were to determine information technology factors associated with health information use among HCWs in Marsabit county and to determine human resource factors associated with health information use among HCWs in Marsabit county.

The researcher targeted 201 HCWs who were issued self-administered questionnaires. Out of these, 195 were able to fill the questionnaires successfully and return them. This makes a response rate of 97.01%. This response rate was deemed as sufficiently representative of the target population as a response rate of more than 75% is reported by Bryman as representative.[9]

Table 1 shows that the majority of respondents 119 (61%) were aged between 24 to 29 years with 52% having diploma qualifications.

Further, 103 (52.8%) had diplomas, 21 (10.8%) had higher diplomas, 59 (30.3%) had degrees, 4 (2.1%) had masters and 8 (4.1%) had a certificate. The findings suggest that most of the respondents targeted in Marsabit county had served for more than four years, were below 30 years of age, were mainly serving in sub-county and county referral hospitals, and were mainly male.

Information technology factors associated with the use of RH data

The study aimed to determine information technology factors associated with health information use among HCWs in Marsabit county. The respondents were first asked to indicate the total quantity of equipment they

have that is in working condition. Their responses are as provided in Table 2. For easier presentation, the number of equipment was categorized into 0-1, 2-4, 5-7, more than 10.

Table 1: General and demographic characteristics.

Characteristics	Category	Frequency	Percentage (%)
Age (years)	24-29	119	61
	30-35	25	12.8
	36-41	1	0.5
	42-47	35	17.9
	54-59	14	7.2
	>60	1	0.5
Gender	Male	100	51.3
	Female	95	48.7
Religion	Muslim	84	43.1
	Christian	55	28.2
	Traditionalist	16	8.2
	Non-response	40	20.5
Education	Certificate	8	4.1
	Diploma	103	52.8
	Higher diploma	21	10.8
	Degree	59	30.3
	Master	4	2.1
Work experience (years)	1-4	54	26.9
	5-7	46	22.9
	7-9	19	9.5
	9-10	42	21.5
	>10	4	2.1
Type of facility	County referral hospital	98	50.3
	Sub-county referral	84	43.1
	Health center	7	3.6
	Dispensaries	6	3.1
Role	Routine service delivery	133	68.2
	Management	37	19.1
	Department in charge	24	12.3
	Non-response	1	0.5

Table 2: Equipment inventory.

Equipment inventory	Quantity	Responses (%), (n=195)
Laptops	0	86.6 (174)
	1-4	9.7 (19)
	5-9	1 (2)
	>10	0
Desktops	0	54.2 (109)
	1-4	37.1 (75)
	5-9	3.5 (7)
	>10	1.9 (4)
Printers	0	67.7 (58)
	1-4	23.3 (58)
	5-9	0
	>10	0
Modems	0	88.6 (178)
	1-4	8.7 (17)
	5-9	0
	>10	0
Uninterrupted power supply (UPS)	0	72.1 (145)
	1-4	24.6 (48)
	5-9	1 (2)
	>10	0

Continued.

Equipment inventory	Quantity	Responses (%), (n=195)
Generator	0	36.5 (74)
	1-4	62.1 (121)
	5-9	0
	>10	0

Table 3: Availability of equipment and association with frequency RH data use.

| Equipment inventory	Quantity	Count	RH data use			DF	X²	P value
			Rarely	**Sometimes**	**Always**			
Laptop	0-2	F	36	70	69	4	7.678	0.195
		%	18.56	36.09	35.57			
	2-4	F	1	6	10			
		%	0.52	3.09	5.15			
	5-7	F	0	0	2			
		%	0	0	1.03			
Desktop computers	0-1	F	22	44	45	4	13.744	0.003
		%	11.34	22.68	23.20			
	2-4	F	14	26	31			
		%	7.22	13.4	15.98			
	5-7	F	1	6	5			
		%	0.52	3.09	2.58			
Modems	0-1	F	35	74	73	2	0.162	0.166
		%	18.04	38.14	37.63			
	2-4	F	2	2	8			
		%	1.03	1.03	4.12			
UPS	0-1	F	31	51	63	4	7.759	0.331
		%	15.98	26.29	32.47			
	2-4	F	6	24	17			
		%	3.09	12.37	8.76			
	5-7	F	0	1	1			
		%	0	0.52	0.52			
Generator	0-1	F	12	22	34	2	6.260	0.026
		%	6.19	11.34	17.53			
	2-4	F	25	54	47			
		%	12.89	27.84	24.23			
Printers	0-1	F	26	56	55	4	8.508	0.759
		%	13.4	28.87	28.35			
	2-4	F	11	20	25			
		%	5.67	10.31	12.89			
	5-7	F	0	0	1			
		%	0	0	0.52			

The Table 2 shows equipment inventory according to HCWs ' responses.

The majority of respondents indicated that they did not have the following equipment; Laptops 174 (89.2%), desktops 109 (55.8%), modems 178 (91.2%), UPS 145 (74.4%), generator 72 (36.9%), and printer 136 (70.0%). The finding revealed that Information technology accessories such as desktops averaged (2-4) 38.4% in most of the facilities, with modems, printers, and UPS being minimal as per the responses of the HCWs. The generator was reported by the majority 121 (62.0%), indicating they have more than one functional generator.

However, in regards to desktop, most of those with 1-4 computers 31 (15.98%) were likely to use RH data always while those with 5-9 computers 6 (3.09%) were likely to use RHI data sometimes and most of those who rarely use RHI data were likely those with no desktop computers. These findings imply that the presence of desktop computers was likely to influence the use of RHI data as supported by the statistically significant p=0.003. It can, therefore, be argued that in Marsabit county, the presence of desktop computers is likely to influence the use of RHI data (Table 3).

Computer skills

The respondents were also asked to rate their computer skills.
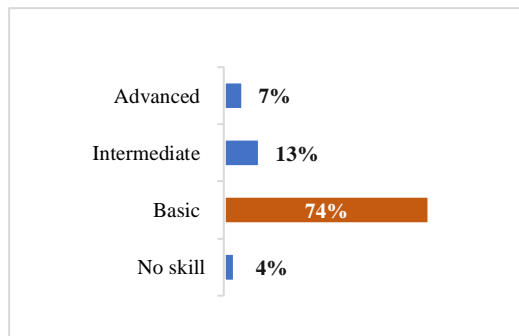
Figure 1: Most respondents had basic computer skills.

The majority 144 (74.61%) claimed that their computer skills were basic level, 27 (13.99%) were intermediate, 14 (7.25%) had advanced skills and 8 (4.15%) claimed they had no skills at all. The findings suggest that the majority of the HCWs have only basic skills in computers and may have difficulties manipulating raw data to provide information/knowledge that can be used for decision-making processes.

Internet connectivity and power supply

The researcher also asked the respondents to indicate whether they had access to the internet, Wi-Fi, and electricity. The table provided their responses.

Table 4 shows HCWs' response on access to the internet and power supply.

The HCWs were also asked whether they have access to an internet network and the majority 139 (71.3%) indicated they have access to the internet while 128 (66.6%) also indicated that they have access to Wi-Fi and 163 (84.8%) claimed they have a continuous supply of electricity. These findings indicate that access to Wi-Fi, internet and continuous power supply is not a problem in Marsabit health facilities.

Type of software

The researcher then asked the respondents to indicate the type of software they use.

The shows the response on the types of software used in the facility.

The Table 5 shows that the majority of 76 (39%) use DHIS2, 69 (35.4%) indicated they used MedBoss while 37 (19%) used both MedBoss and DHIS2. While 4 (2.1%) indicated they had used LIMS and 7 (3.6%) had no software.

From these findings, it can be deduced that the most utilized health information software was the DHIS2, MedBoss, or a combination of both software. LIMS were found to be rarely used in health facilities because it was only found in laboratory department.

The researcher sought to determine whether the type of software available was associated with the use of RH information in decision-making processes.

The majority of those who always use RHIS in their decision-making processes 35 (18.23%) and 34 (12.71%) use MedBoss and DHIS2 software while those who use LIMS and those who lack software 2 (1.04%) and 6 (3.13%) respectively rarely make decisions guided by RHIs. The table also shows that the type of health information software utilized by the health facilities has a statistically significant influence on its use of RHIs in decision-making processes at a $p=0.028<0.05$ as shown in the Table 6.

The KIIs were asked to indicate the challenges facing the use of RHIS. One of them argued; *"The challenges include our limited skilled personnel as most of the staff are not computer savvy."*

The other KII, argued, "*We have inadequate tools and equipment for conducting collection, analysis, and dissemination of data for decision-making processes. It is paramount that the infrastructure and the needed skills, tools, and equipment's are there to ensure timely decision making and information sharing."*

Human resource factors and health information use

The study sought to determine human resource factors associated with health information use among HCWs in Marsabit county. The researcher purposed to find out whether the respondents had received training in different data management functions. Their responses are as provided in Table 7.

Training responses on different data management functions.

The Table 8 shows that the majority of respondents lacked training in the following management functions: RH data management at 116 (59.5%), data processing at 157 (80.5%), data quality at 155 (79.2%), data display at 166 (85.1%), data reporting at 148 (75.9%), and data use for decision making 153 (78.5%). Generally, the majority of respondents do not have training in several aspects of data management. The limited training may have an impact on the overall use of RH data in decision-making processes. Therefore, the study conducted a chi-square test of goodness fit to determine whether the training of HCWs on RH data management influenced the frequent use of RH.

Table 4: Most had an internet connection and electricity.

Access		n=192	Yes	No	No response
Is there access to an internet network?	F		137	52	3
	%		71.3	27.0	1.5
Is there access to Wi-Fi (Wireless fidelity)	F		128	62	2
	%		66.6	32.2	1.0
Is there a continuous electricity supply?	F		163	25	4
	%		84.8	13.0	2.0

Table 5: DHIS2 and MedBoss are the most frequently used software.

What type of health information software is available?		
Software types	Frequency	Percentage (%)
DHIS2	76	39.0
LIMS	4	2.1
MedBoss	69	35.4
both DHIS2 and MedBoss	37	19.0
None	7	3.6
Total	193	99.0
Non-response	2	1.0
	195	100.0

Table 6: Types of software and frequency of RHI use in the decision.

Type of software	RH use			Df	X²	P value
	Rarely	Sometimes	Always			
Dhis2	15	26	35			
	7.81	13.54	18.23			
LIMS	2	0	2			
	1.04	0	1.04			
MedBoss	14	20	34	8	17.192	0.028
	7.29	10.42	17.71			
both Dhis2 and MedBoss	6	13	18			
	3.13	6.77	9.38			
None	6	1	0			
	3.13	0.52	0			

Table 7: Training on data management.

Have you had training	Count	Yes	No	Non-response
Data management?	F	75	116	4
	%	38.6	59.5	2.1
Data processing?	F	34	157	4
	%	17.4	80.5	2.1
Data quality?	F	37	155	3
	%	19	79.2	1.5
Data display or visualization?	F	25	166	4
	%	12.8	85.1	2.1
Data report?	F	44	148	3
	%	22.6	75.9	1.5
Data use for decision-making?	F	39	153	3
	%	20	78.5	1.5

Table 8: Data management training and association with RHI use.

Training	n=195, (%)	Use of routine data			DF	X²	P value
		Rarely	Sometimes	Always			
RHI and data management?	Yes	3.65	15.68	19.79	2	29.605	0.035
	No	20.89	21.88	15.63			

Continued.

Training	n=195 (%)	Use of routine data			DF	X²	P value
		Rarely	Sometimes	Always			
Data processing?	Yes	2.62	4.19	10.99	2	10.958	0.027
	No	35.08	16.75	30.58			
Data quality?	Yes	1.56	5.21	12.5	2	16.393	0.005
	No	33.85	29.17	17.71			
Data display or	Yes	1.57	2.62	8.90	2	13.031	0.015
	No	36.65	36.65	17.8			
Data report?	Yes	2.08	9.90	10.9	2	21.023	0.048
	No	30.73	29.17	17.91			
Data use for decision making	Yes	2.1	6.25	11.98	2	22.153	0.040
	No	32.81	29.69	17.19			

Chi-square test to determine the association between the training and frequency of RH use.

The study revealed that RHI data management, data processing, data quality, data display/visualization, data report, and data use in decision making had a statistically significant influence on the probability of using RH information. Overall, these findings reveal that training increases the likelihood of HCWs utilizing RHI in the health care facilities in Marsabit county.

The researcher asked the KIIS to identify the ways that service delivery staff can be motivated to engage and understand the data they collect. One of the KIIs argued *"Mentoring and training are also crucial for helping motivate the staff to learn to use the RHIS data they collect in making decisions."*

DISCUSSION

The study found that 41.75% of the respondents always use RH data to make decisions while 39.16% use them sometimes and 19.06% use them rarely. The findings also revealed that county and sub-county decision forums (health management teams) were established to monitor and discuss the performance and management of health facilities. Generally, the use of RH data in decision-making was not overly high. The study also found that RH data were used to formulate plans (p=0.014), to prepare the budget (p=0.027), for medical supply and drug management (p=0.002), to decide on issues such as staff deployment (p=0.005), for service delivery improvement (p=0.000) and identify gaps and set priorities (p=0.000).

Generally, the findings imply that RH data are utilized by the health facilities for different purposes, showing RH data's potential to serve different purposes within the health care system. This is in line with the findings in the literature we having a reliable free and open-source web based DHIS system has the potential to improve the use of health data in decision making.[7] This is contrary to the world bank, which suggests that whilst the main aim of HIS is to allow the processing of valuable information for decision making, a great deal of the data collected in the developing countries do not go to the processing stage, therefore it is unreal.

Information technology

The major findings in this section revealed that computers such as laptops and desktops averaged 2-4 in most of the facilities, with other accessories being minimal as per the responses of the HCWs. The generator was reported by the majority 121 (62.1%) indicating they have more than one functional generator. This supports the argument by study who found that limited infrastructure in terms of reliable internet connections and consistent electricity supply challenges effective use of health data.[10] Similar findings are reported by study who reports that innovation in health information systems is challenged by technical expertise amongst the health care managers and the lack of appropriate infrastructures like computer labs for data analysis and dissemination.[11] The findings in this study revealed that the majority (74.6%) of the HCWs had only basic computer skills.

In regards to access to the internet and electricity, the respondents indicated they had no challenge as it was found that internet access (71.3%), Wi-Fi (62.1%), and continuous electricity supply (83.6%). This is a promising finding as argued that digital technology is paving way for new models of care and shifting the focus of health.[10] With digital health, technological infrastructure plays a critical role in the collection, collation, analysis, and dissemination of data.

Lastly, the section found that the type of health information system in use had a significant association with the use of RHI for decision making at a p=0.028<0.05. DHIS2 and MedBoss were found to be the most utilized system in routine decision-making in health facilities. Similar claims are made by study that opined that having a reliable free and open-source web-based DHIS system has the potential to improve the use of health data in decision making.[7] Also, another study affirms that effective and efficient management of health systems globally relies on the well-functioning HMIS.[12] They report that weak informational system where the findings revealed that the lack of appropriate technology and skills in technological innovation hamper the use of data.

CONCLUSION

The study found that RH information is used for decision-making frequently to prepare budgets, medical supply and drug management, staff deployment, service delivery improvement and identification of gaps, and setting priorities. It was also found that the health facilities lacked ample IT accessories such as UPS and desktop computers. Even though, accessibility of the internet and power supply was found not limited.

Further, the study determined that the majority of HCWs do not have fundamental training in RH information management. This lack of training may have an impact on the overall use of this data. The finding displays that routine data management training could increase the likelihood of HCWs using RH information for decision making. The study also observed that internet connectivity was not limited. However, RHI uses not optimal in Marsabit county requiring further assessment to unearth out other factors affecting the use of RH.

RECOMMENDATIONS

The study makes the following recommendations to fortify the use of RHI within the health department in Marsabit County. County government of Marsabit (Health department) ought to fast-track the provision of IT accessories both portable workstations, modems, desktops, printers in health facilities to improve the RH data management practices. County government of Marsabit (Health department) ought to provide continuous training to the health workers focusing on the use of RH data by organizing in-job training and mentorships especially in basic computer skills, information processing, analysis, and interpretation of results for use in decision making.

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