

Original Research Article

Determinants of effective staff performance in improving data management in healthcare: a case study of Mombasa county, Kenya

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ABSTRACT

Background: Previous research in developing countries has revealed a variety of issues that may jeopardize data quality in HIS. According to research, many developing countries health information systems are unable to provide the necessary support information. The information produced is of low quality and the information processed is not made good use of to inform decisions. The lack of promotion of information culture harms the performance of HIS. The general objective of the study was to assess factors influencing effective staff performance in improving data management in selected facilities in Mombasa County, Kenya.

Methods: The study adopted a cross-sectional research design with a mixed methods approach. Quantitative data were analyzed using frequencies, proportions, mean, standard deviation, coefficient of variation, cross-tabulations, Phi correlation coefficient, and binary logistic regression (at a significance level of 0.05). Qualitative data were analyzed using content analysis.

Results: The results indicated that organizational factors ($\phi=0.268$, $p>0.05$), staff effectiveness ($\phi=0.408$, $OR=0.056$, $p>0.05$) and individual attributes ($\phi=0.141$, $p>0.05$) did not have significant influence on staff performance in improving data management, while knowledge and skills ($\phi=0.535$, $OR=0.031$, $p<0.05$) was found to have a significant influence on staff performance in improving data management.

Conclusions: The study concludes that the knowledge and skills of health care workers are a significant predictor of improvement in data management at the health facilities in Mombasa County.

Keywords: Data management, Individual attributes, Knowledge and skills, Organizational factors and staff performance

INTRODUCTION

Health information is the foundation of health system building blocks that strengthens access to information, allowing health professionals to apply the same principles in improving policy, planning, implementation, monitoring, and evaluation of health systems.¹ Worldwide, significant human and financial resources are invested in data collection at health facilities and in the community. Health workers collect information from

patients and health facilities and report on health facility activities regularly. As a result, it facilitates communication between health workers and patients and allows for continuous patient management.² However, because of its limited completeness, timeliness, representation, and correctness, this valuable data source is frequently ignored in low- and middle-income countries (LMICs). Program managers and other decision-makers use general health information less when they have low trust in its quality.³ Traditional information systems in developing countries do not provide the

required information to support decision-making for a variety of reasons.⁴ Aside from the rapid expansion of data capturing and reporting requirements within the health information system, there is little evidence that data is used.⁵ According to previous studies, data users have various information needs, require information at various levels of data, and play various roles in the decision-making process.⁶ Research conducted in Malawi found that health facilities performed well in selected data quality categories, such as consistency across registers, reports, and DHIS-2 on women completing fourth ANC visits throughout the campaign. However, in some service areas such as ARI, data quality was low. While health offices and hospitals were more likely to have qualified HMIS staff, there was insufficient staff training at the health facility level, which contributed to insufficient data level and low data usage at an institutional level.⁷ According to a review of Kenyan data quality, documents showed that completeness and timely reporting of data were lower than anticipated. Comparisons of the regions tested in the three frontiers revealed that they were all more than 60% of total, time and availability. Lower Eastern had all three of these borders with more than 80% and Nyanza and Western were available and 90% complete although the time was 80% in the West and 78% in Nyanza. The best performing region is the Northeast with 79% availability, 65% completeness, and 69% punctuality.⁸ According to KHIS policy objective, there has been significant improvement in HIS over the years, however, some gaps still exist; there are insufficient guidelines and skills of HIS staff, data management of unskilled staff, lack of integration, and poor co-operation, among others.⁹ An analysis of the Mombasa County Data Verification Report presented under the transforming universal care project health systems revealed that family planning services provided and reported on DHIS2 suggested that IUCD was not properly recorded (over-reporting) at 221.8 percent followed by emergency pills with over-reporting mean points. -50 percent compared to FP inclusion and integration.⁹ In another report, a comparison of the source document and DHIS2 in the ANC's fourth visit data showed the accuracy of the April-June 2018 review period was reported to be over 86%.⁹

METHODS

Research design and approach

A cross-sectional research design was used for this investigation. The design helps in identifying relations between variables that are not manipulated. In this study, the design helped to examine factors influencing effective staff performance in improving data management in selected facilities in Mombasa, Kenya. A mixed methods approach was used for this project, which included a questionnaire survey of health care workers (HCWs), in-depth interviews and focus group discussions (FGDs) with health facility in-charges and data managers, and data verification through document review.

Target population

The study population comprised of 2080 health care workers from level 5, 4 and 3 health facilities in Mombasa County drawn from public, private and FBO/NGO sectors (Mombasa County, 2018). The study focused on health workers who were responsible for daily documenting in-patient source documents and used routine data to improve quality, including In-charges of the facilities, health facility data managers, clinicians, nurses, health records information officers (HRIOs), medical laboratory officers (MLOs) and Pharmacists/technologist. In addition, source documents at the selected facilities, MOH 711 reporting tools and the KHIS were part of the study population.

Sampling and sampling methods

The researcher purposively sampled 19 (8%) of the 242 health facilities in public, private, and FBO/NGO sectors in Mombasa County based on the workload of the facilities. Consequently, 372 HCWs were selected using stratified random sampling, out of which 38 were facility in-charges and data managers who were used as key informants. In conducting data verification, the researcher purposively selected 4 source documents in each of the 19 selected facilities, the MOH 711 reporting tool at the respective facilities, and the KHIS were reviewed.

Inclusion criteria

The study included employees who consented to participate in the study, registered employees, and employees who were data managers at health facilities which were approved as levels 3, 4, and 5 in public and private sectors.

Exclusion criteria

The study excluded Health care workers employed six months before the study, Level 4, 3 and 2 public facilities, and HCWs involved in the pre-test study as well as Health care workers from the selected facilities who were absent from duty during the data collection period.

Scope of the study

The study focused on factors influencing effective staff performance in improving data management in selected facilities in Mombasa, Kenya. It targeted health care providers in public, private, and faith-based facilities in the six sub-counties. The study was conducted between July and September 2021.

Data collection

The study conducted the questionnaire survey with 334 HCWs (clinicians, nurses, HRIOs, MLOs, HMIS officers and Pharmacists) from the 19 selected health facilities using a structured questionnaire. Two (2) sets of KIIs

were conducted with 19 in-charges of the selected facilities and 19 health facility data managers respectively. After conducting the KIIs, four (4) FGDs were conducted by bringing together the 38 participants to discuss the emerging issues from the KIIs.

Data analysis

Frequencies, proportions, mean, standard deviation and coefficient of variation were calculated to summarize the findings. Cross tabulation, Phi correlation and binary logistic regression (at a significance level of 0.05) were conducted to identify factors associated with effective staff performance in improving data management in selected facilities in Mombasa County.

RESULTS

Data was collected from 299 (89.5%) HCWs and 36 (94.7%) health facility in-charges/data managers using survey questionnaires and KIIs/FGDs respectively. The questionnaire was made of likert scales containing four-point likert-type items which were used to measure the opinions of the respondents towards the underlying constructs in the study. All the Cronbach's alpha test scores were >0.7 indicating that the likert scales were reliable in representing the underlying constructs in the study. Additionally, all the KIIs and FGDs transcripts had inter-coder reliability ratings of 80% and above which were considered acceptable in this study.

Data processing

Primary data was collected using questionnaires consisting of four-point Likert scale data sets (1-strongly disagree, 2-disagree, 3-agree, 4-strongly agree) which were used to measure the opinions of the respondents towards the underlying constructs in the study. Descriptive statistics including mean, standard deviation, and coefficient of variation were calculated to rate their views. The coefficient of variation was computed to determine the degree to which individual responses varied from the mean, with coefficients that were $>30\%$ considered high.

Thus, coefficients that were $<30\%$ implied that the mean represented the collective opinion of the respondents. Additional data was obtained through a data verification checklist to measure improvement in data management across the selected 19 health facilities in Mombasa County to augment data on the dependent variable collected using questionnaires. The results obtained were then categorized using a two-point Likert scale as either (1) not improved or (2) improved. Descriptive statistics using frequencies and percentages were used to summarize the findings. To improve the validity of the model, the four category response data set, strongly disagree, disagree, agree, and strongly agree, was merged into two category responses which entailed disagree and agree using the following procedure; Max=highest score

(HS)=4; Min=lowest score (LS)=1; range=HS - LS=3, No. of categories=two=2; interval=range÷ No. of categories= $3 \div 2 = 1.5$, disagree (Category-1) = Min through (Min + interval) = 1.00 – 2.50, agree (category-2) = (Max - Interval) through Max= 2.51-4.00. The composite scores obtained by combining the Likert-type items were then recoded based on the two-category response data set. All mean scores falling between 1.00 through 2.50 were recoded to 1 (disagree), while all mean scores falling between 2.51 through 4.00 were recoded to 2 (agree).

The merged data were further aggregated using mean scores to obtain facility-based aggregate scores for the selected 19 health facilities. Data on the dependent variable (data demand and use) from the questionnaire was further combined with data from the verification checklist to obtain a composite score (improvement in data management). Phi correlation coefficient and binary logistic regression were then conducted to determine the relationship between the independent variables (organizational factors, staff effectiveness, knowledge and skills, and individual attributes) and the dependent variable (improvement in data management).

Improvement in data management

Improvement in data management was assessed using four indicators including improvement in health system performance, improvement in health outcomes, data quality, and data demand and information use. Improvement in health system performance and health outcomes were assessed by comparing data for the quarter of July-September 2021 with data for a similar period in 2020. Data quality was assessed by verifying the rate of discrepancy in data reporting from facility source documents to KHIS (a discrepancy rate of less than 5% was deemed acceptable), while data demand and information use were assessed based on respondents' opinions using a Likert scale rating. The results indicated that health outcomes improved (Figure 1), data reporting was accurate (Figure 2), and data demand and information use were at high levels (Table 1).

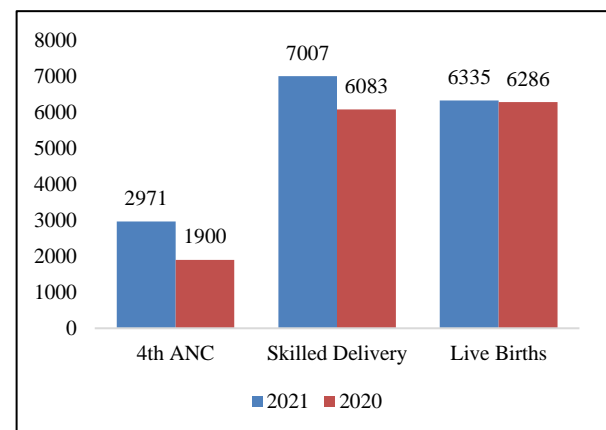


Figure 1: Health outcomes.

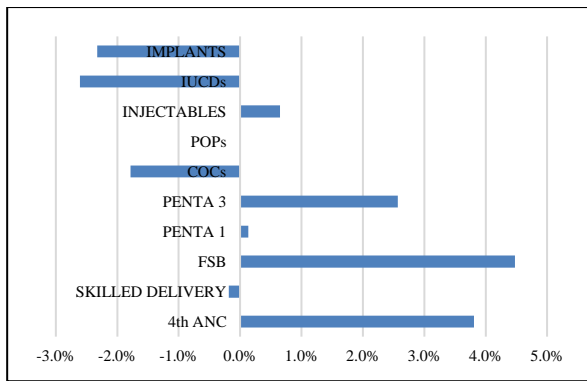


Figure 2: Data discrepancy rate.

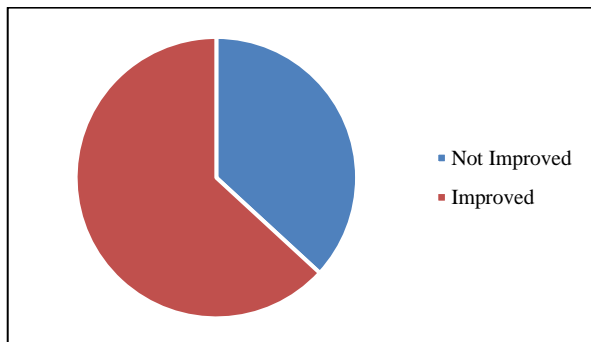


Figure 3: Improvement in data management.

The researcher rated each facility using a 2-point rating scale, (1) not improved and (2) improved, based on the

four indicators to determine whether there was an improvement in data management or not. Facilities were rated as improved if their; - FSB for 2021 had declined compared to 2020; health outcomes for 2021 had improved compared to 2020; aggregate discrepancy rate was less than $\pm 5\%$, and the combined average rating on data demand and information use was above 2.5. The ratings for the four indicators were aggregated using mean whereby facilities with mean values between 1 through to 1.5 were categorized as not improved while facilities with mean values between 1.51 to 2 were categorized as improved. Thus, when data on the four indicators (health system performance, health outcomes, data quality, and data demand and information use) were aggregated, the results indicated that data management improved in 12 (63%) of the health facilities (Figure 3).

Organizational factors associated with data management

The first specific objective of the study was to establish organizational factors affecting data management in selected facilities in Mombasa County, Kenya as illustrated in (Table 2). Descriptive statistics results indicated that in the selected facilities; staff had clear roles in data management, and facilities documented epidemiological trends. Additionally, respondents widely differed on whether staff was able to use standard HMIS tools; the facilities had HMIS budget allocation; staff had access to office space/equipment/tools; and whether staff received managerial support.

Table 1: Data demand and use.

Parameters	N	Minimum	Maximum	Mean	SD	Coefficient of variation (%)
Planning and budgeting	299	2	4	3.74	0.492	13.2
Priority setting	299	1	4	3.64	0.633	17.4
Disease monitoring	299	1	4	3.63	0.670	18.5
Resource mobilization	299	1	4	3.33	0.867	26.0
Staff distribution	299	1	4	3.35	0.819	24.4
Staff training	299	1	4	3.20	0.855	26.7
Quality improvement	299	1	4	3.39	0.784	23.1

Table 2: Organizational factors associated with data management.

Factors	N	Min	Max	Mean	SD.	Coeff. of Var. (%)
Staff use standard HMIS tools comfortably	299	1	4	2.81	0.796	28.3
Staff have clear roles and responsibilities in data management	299	1	4	2.90	0.835	28.8
Facility documents epidemiological trends	299	1	4	2.85	0.811	28.5
Routine MOH registers and summaries are complicated	299	1	4	2.13	1.105	51.9
HMIS staff have access to office space/equipment's and tools	299	1	4	2.81	0.909	32.3
Facility has HMIS budget allocation	299	1	4	2.68	0.911	34.0
Staff get regular support from seniors	299	1	4	2.86	0.857	30.0

Table 3: Staff effectiveness associated with data management.

Parameters	N	Min	Max	Mean	SD	Coeff. of Var. (%)
Staff can use all HMIS tools (documentation) comfortably with minimum support.	299	1	4	2.68	0.881	32.9
Staff cross check monthly reports (MOH 711) before submitting it to the next level	299	1	4	2.99	0.877	29.3
Staff can make a simple analysis of the data	299	1	4	2.87	0.797	27.8
Staff can demonstrate beyond numbers –interventions	299	1	4	2.75	0.841	30.6
Staff can provide complete and accurate reports which are used for decision making	299	1	4	2.95	0.850	28.8
Staff can share information with seniors and peers during review meetings	299	1	4	2.98	0.837	28.1
Staff can recognize disease patterns and get important information about patient/client care.	299	1	4	2.82	0.851	30.2
Decisions are based on evidence on data	299	1	4	2.85	0.880	30.9

Table 4: Knowledge and skills associated with data management.

Parameters	N	Min	Max	Mean	SD	Coeff. of Var. (%)
Facility/section decisions are based on evidence preference	299	1	4	2.51	1.060	42.2
Facility/section has adequate HMIS skilled staff responsible for routine health information tasks	299	1	4	2.47	1.085	43.9
Facility/section staff are trained in data management	299	1	4	2.50	1.091	43.6
Facility/Section staff are involved in planning/implementation and monitoring of service delivery/programs indicators	299	1	4	2.57	1.089	42.4
Facility/section staff are involved in quality improvement teams	299	1	4	2.46	1.066	43.3

Staff effectiveness associated with data management

The second specific objective of the study was to assess staff effectiveness for improving data management in selected facilities in Mombasa County, Kenya as illustrated in (Table 3). Descriptive statistics results indicated that health providers in the selected facilities were able to; cross check monthly reports (MOH 711) before submitting it to the next level; make a simple analysis of the data; provide complete and accurate reports; and share information with seniors and peers during review meeting. Additionally, respondents widely differed on whether; staff could use all HMIS tools comfortably with minimum support; staff could demonstrate beyond numbers; staff could recognize disease patterns and get important information about patient/client care; and whether decisions were based on evidence.

Knowledge and skills associated with data management

The third specific objective of the study was to determine levels of knowledge and skills associated with data quality management among staff in selected facilities in

Mombasa County, Kenya. As illustrated in (Table 4), descriptive statistics results indicated that there were wide differences of opinion on whether; facility/section decisions were based on evidence preference; that facility/ section staff were involved in planning /implementation and monitoring of service delivery/programs indicators; the facility/section had adequate HMIS skilled staff responsible for routine health information tasks, facility/section staff were trained in data management; and whether facility/section staff were adequately involved in quality improvement teams.

Individual attributes associated with data management

The fourth objective of the study was to identify individual attributes associated with data quality management among staff in selected facilities in Mombasa County, Kenya. As illustrated in (Table 5). Descriptive statistics results indicated that respondents had divergent views on whether in the selected facilities; staff routinely performed data quality checks before submitting to the next level; staff used data to inform patients/clients interventions; staff routinely displayed data to monitor performance; and there were data demand and information use champions.

Table 5: Individual attributes associated with data management.

Parameters	N	Min	Max	Mean	SD	Coeff. of Var. (%)
Staff routinely perform data quality checks before submitting to the next level	299	1	4	2.77	0.848	30.6
Staff use data to inform patients/clients interventions	299	1	4	2.75	0.883	32.1
Staff routinely display data to monitor performance	299	1	4	2.76	0.885	32.1
Facility/section have a data demand and information use champion	299	1	4	2.71	0.930	34.3

Table 6: Phi correlation coefficient.

Parameters		Data Management		Phi Coefficient		
		Not improved	Improved	Value	N	Sig.
Organizational factors	Disagree	2	10	0.268	19	0.243
	Agree	5	11			
Staff effectiveness	Disagree	3	1	0.408	19	0.075
	Agree	4	11			
Knowledge and skills	Disagree	4	1	0.535	19	0.020
	Agree	3	11			
Individual attributes	Disagree	2	2	0.141	19	0.539
	Agree	5	10			

Table 7: Contribution of independent variables in the model.

Parameters	B	SE	Wald	df	Sig	Exp (B)	95% CI for Exp (B)	
							Lower	Upper
Staff effectiveness (1)	-2.880	1.633	3.109	1	0.078	0.056	0.002	1.379
Knowledge and skills (1)	-3.489	1.614	4.670	1	0.031	0.031	0.001	0.723
Constant	2.805	1.305	4.618	1	0.032	16.524	-	-

Variable(s) entered on step 1: staff effectiveness and knowledge and skills.

Phi correlation coefficients

The researcher conducted a Phi coefficient test, at a significance level of 0.05 as indicated in (Table 6), to determine the strength of association between the independent variables and the dependent variable. The results showed that organizational factors ($\phi=0.268$, $p>0.05$), staff effectiveness ($\phi=0.408$, $p>0.05$) and individual attributes ($\phi=0.141$, $p>0.05$) had no significant relationship with improvement in data management. However, the results indicated that knowledge and skills ($\phi=0.535$, $p<0.05$) had a strong positive relationship with improvement in data management. This means that an increase in knowledge and skills would be accompanied by an improvement in data management.

Regression model

A binary logistic regression was performed to assess the effects of staff effectiveness and knowledge and skills on staff performance in improving data management in the selected health facilities in Mombasa County as indicated in (Table 7). The Hosmer-Lemeshow test, at a significance level of 0.05, yielded a p-value greater than 0.05, which indicated that the model fit the data. The

results also indicate that the regression model correctly classified 94.7% of cases. Nagelkerke R^2 indicated that the regression model explained 59.9% of the variance in improvement in data management. The regression results indicated that staff effectiveness ($OR=0.056$, $p>0.05$) did not have a significant influence on staff performance in improving data management, while knowledge and skills ($OR=0.031$, $p<0.05$) was found to have a significant influence on staff performance in improving in data management. The results indicated that a facility was 97% less likely to experience improvement in data management if the facility staff lacked adequate knowledge and skills. This means that lack of adequate HMIS skilled staff responsible for routine health information tasks, lack of staff that were adequately trained in data management, and lack of involvement of staff in quality improvement teams hindered the improvement in data management in some health facilities.

DISCUSSION

The study established that health facilities in Mombasa County experienced a decline in health system performance (increased FSBR) and an improvement in

health outcomes for the year 2021 compared to 2020, accuracy in data reporting, and high levels of data demand and information use. Thus, in general, there was an improvement in data management in most health facilities. This is inconsistent with a study conducted in Tanzania that examined the adoption of national data collection methods and data quality at a single regional hospital in Tanzania.¹⁰ The study findings indicated a complete failure to ensure the absoluteness and correctness of source documents used for reporting outside of the health institution. Additionally, findings revealed that facility data was not being used effectively for decision-making. Another study conducted in Nigeria used the Measure Evaluation routine data quality audit tool to analyze the quality of HIV data in Nigeria¹¹. The study discovered insufficient quality information in Nigerian ART clinics, which was due to late data transmission from health facilities and a lack of skills among health facility employees.¹¹ The study also established that health providers in Mombasa County had clear roles and responsibilities in data management, and documented epidemiological trends. Additionally, respondents widely differed on whether they were able to use standard HMIS tools, had access to office space/equipment/tools, received adequate managerial support, and whether they had adequate HMIS budget allocation. However, organizational factors had no significant association with staff performance in improving data management in health facilities in Mombasa County. These findings are inconsistent with the findings in a study conducted in Benin.¹² In their study, they established that infrastructural and system-based factors including the availability of appropriate data collection tools and equipment, amount and quality of human resources in and use of health information systems, health management standards for responsiveness, standardized data quality control, and robust information on health data, influenced data quality in general health information systems.¹²

Additionally, the study revealed that health providers in Mombasa County were able to cross-check monthly reports (MOH 711) before submitting them to the next level, make a simple analysis of the data, provide complete and accurate reports, and share information with seniors and peers during review meetings. Additionally, there were divergent opinions on whether staff could use all HMIS tools comfortably with minimum support, whether staff could demonstrate beyond numbers, staff could recognize disease patterns and get important information about patient/client care, and whether decisions were based on evidence. However, staff effectiveness had no significant influence on staff performance in improving data management in health facilities in Mombasa County. This is inconsistent with findings from a study done in Kenya that established that lack of staff skills in data collection, analysis, and processing, were technical issues that contributed to poor use of information in the public health sector in Tharaka Nithi County.¹³

The study established that there were wide differences of opinion on whether; facility/section decisions were based on evidence preference; that facility/section staff were involved in planning/implementation and monitoring of service delivery/programs indicators; the facility/section had adequate HMIS skilled staff responsible for routine health information tasks, facility/section staff were trained in data management; and whether facility/section staff were adequately involved in quality improvement teams. The results further indicated a significant relationship between knowledge and skills and staff performance in improving data management in the selected health facilities. The results indicated that a facility was less likely to experience improvement in data management if the facility staff lacked adequate knowledge and skills. This is consistent with the findings of a study conducted in ten countries, including Côte d'Ivoire, the Dominican Republic, Ecuador, Ethiopia, Gabon, Honduras, Mexico, Peru, South Africa, and Uganda. The study established that a lack of knowledge and skills in data management has played a significant role in the lack of data quality and information utilization⁵. Another study also revealed that capacity gaps were a barrier to the functioning of the health system, and how effective people are involved.¹⁴ Lastly, the study established that health providers in Mombasa County held divergent views on whether data quality checks were routinely performed before submitting to the next level, whether data was used to inform patients/clients interventions, whether data was routinely displayed to monitor performance, and whether there were data demand and information use champions in the health facilities. However, individual attributes had no significant influence on improvement in data management in health facilities in Mombasa County. The findings are inconsistent with two other studies which revealed found that human resources play a significant role in determining data quality in the general health information system, which is primarily identified by health workers' skills.^{12,15} A study conducted in Botswana revealed that motivation or lack of motivation was a factor in health care employees' decisions, and it continues to be the primary determinant of staff performance.¹⁵ In their study, they indicated that health facilities with well-trained staff and management capacity have better health data.¹² They also noted that health professionals' motivation and the presence of stimulants or mitigators influence data quality in general health information systems.¹²

Limitations

This study had two major limitations. The first is the corona 19 pandemic which disrupted most service delivery in Mombasa County due to most attention shifting to prevention, disease management, and control, for instance, some facilities closed down once they identified staff infected with the disease. This was handled through callbacks. The second was the geographical nature of Mombasa County's public, private,

and FBO facilities in accessing facilities due to protocols. To minimize the challenge, the researcher scheduled appointments with facility management before the data collection period.

CONCLUSION

Based on the findings the study concludes that knowledge and skills are significant contributors to staff performance in improving data management in selected facilities in Mombasa County, Kenya. This implies that health facilities are less likely to experience improvement in data management if the facility staff lack adequate knowledge and skills in data collection, processing, and management.

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