REVIEWED JOURNAL of INTERNATIONAL SOCIAL SCIENCE & HUMANITIES
[ISSN 2663-127X]

Vol. 6, Iss.1 (2025), pp 495 – 507, October 11, 2025. www.reviewedjournals.com, ©Reviewed Journals

INFORMATION COMMUNICATION TECHNOLOGY RESOURCES AS SERVICE DELIVERY ENABLER IN THE MINISTRY OF HEALTH, KAKAMEGA COUNTY, KENYA

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Accepted: September 30, 2025

ABSTRACT

The study investigated Information Communication Technology resources as service delivery enabler in the ministry of health, Kakamega County, Kenya. To achieve the objectives, the study used a combination of explanatory design and descriptive survey research design, specifically multiple regression model. The target population consisted of 406 respondents and the sample size was 121 respondents from the three categories of ministry of health employees in Kakamega County, Kenya. The research adopted a simple random sampling method guided by past surveys of general knowledge of public opinion using a 30% confidence level propagated by John Orodho. Reliability of the instrument was tested using Anova model regression coefficient of 0.05 which was considered acceptable; hence the instrument was reliable. Data was analyzed using descriptive and inferential statistics. Descriptive statistics was used to summarize data while inferential statistics, specifically multiple regression model was used to test hypotheses. The analysis used Statistical Package of Social Sciences (SPSS) and Microsoft excels computer applications to aid data analysis. The results were presented using tables. The findings indicated that Information Technology Resources were found not to be statistically significant in increasing service delivery in public health institutions. The study recommended that human resource is a key player in influencing service delivery in public sector therefore, county government and national government should introduce ICT training to improve human resource skills and not leave ICT as a standalone enabler. The study concluded that ICT cannot work on its own to achieve higher levels of service delivery in the public sector.

Key Words: *Information Communication and Technology, Service Delivery and Health*

CITATION: Ndung'u, G. I., Njoroge, J. G. (2025). Information communication technology resources as service delivery enabler in the ministry of health, Kakamega County, Kenya. *Reviewed Journal of Social Science & Humanities*, 6 (1), 495 – 507.

BACKGROUND

Service delivery as defined by International Organization for Standardization (ISO) is a relative concept and in most cases where inherent characteristic of a service meets the requirements of a patient, (Reinartz, 2014). Service delivery is a common phrase used to describe the distribution of basic resources which citizens depend on like; public health, water, electricity, sanitation infrastructure, land, and housing (Janice Dean, 2014, Sirite, Minja & Njoroge, 2025). Unfortunately, the governments' provideabilty on these resources is unreliable greatly inconveniencing a lot of people. In response, the number of "service delivery protests" have become more popular.

Information Communication Technology (ICT) as defined by Wikipedia the free encyclopedia is an extended term that stresses the role of unified communications and the integration of telecommunications, which are wireless signals and telephone lines, computers as well as necessary enterprise software, middleware, storage, and audio-visual systems, which enable users to access, store, transmit, and manipulate information. The term ICT is also used to refer to the convergence of audio-visual and telephone networks with computer networks through a single cabling or link system. There are large economic advantages such as huge cost savings due to elimination of the telephone network and filing system, to merge the telephone network with the computer network system using a single unified system of cabling, signal distribution and management. However, ICT has no universal definition, as "the concepts, methods and applications involved in ICT are constantly evolving on an almost daily basis.

The broadness of ICT covers any product that will store, retrieve, manipulate, transmit or receive information electronically in a digital form, which is operationalized in two main domains that is Computer and the Internet. A computer is defined as a programmable electronic device designed to accept data, perform prescribed mathematical and logical operations at high speed, and display the results of these operations. Mainframes, desktop and laptop computers, tablets, and smartphones are some of the different types of computers. British Dictionary defines a computer as a device, usually electronic, that processes data according to a set of instructions. The digital computer stores data in discrete units and performs arithmetical and logical operations at very high speed. The analog computer has no memory and is slower than the digital computer but has a continuous rather than a discrete input. The hybrid computer combines some of the advantages of digital and analog computers. (Margret Rouses 2012) Internet, sometimes called "the Net," is a worldwide system of computer networks which is a network of networks in which users at anyone computer can, if they have permission, get information from any other computer and sometimes talk directly to users at other computers. The Internet was conceived by the Advanced Research Projects Agency (ARPA) of the United States of America in 1969 and was first known as ARPANet. The original aim was to create a network that would allow users of a research computer at one university to "talk to" research computers at other universities. A side benefit of ARPANet's design was that, because messages could be routed or rerouted in more than one direction the network could continue to function even if parts of it were destroyed in the event of a military attack or other disaster.

Kakamega County is a county in the former Western Province of Kenya. Its capital and largest town is Kakamega. It has a population of 1,660,651 and an area of 3,033.8 km².The county has twelve constituencies (2010) which are; Malava Constituency, Lurambi Constituency, Shinyalu Constituency, Ikolomani Constituency, Khwisero Constituency, Butere Constituency, Matungu Constituency, Mumias East Constituency, Mumias Constituency Navakholo Constituency, and Lugari Constituency. There are eight Sub-County hospitals with inadequate facilities (equipment, infrastructure and spacing). Namely they are Kakamega County Referral Hospital, Likuyani Sub-County Hospital, Lumakanda Sub-County Hospital, Butere Sub-County hospital, IkolomaniSub-County Hospital, Malava Sub-County Hospital,Iguhu Sub-County Hospital, Khwisero Sub-County Hospital and Lurambi Sub-County Hospital.

According to Mrs. Mukabane the Minister for Health Services 2015 the health docket is concerned with ensuring citizens and non-citizens access quality and affordable health services. This includes ensuring that interventions are put in place to encourage healthy living and emphasizing on prevention when it comes to tackling debilitating illnesses. This sector comprises of: Public Health, Sanitation and Medical Services. The sector offers opportunities to invest in: Teaching and referral hospital, Medical services, Medical training and Modernization, automation of health services. The ministry of health in Kakamega county has established structures with a view of improving service delivery in hospitals, primary health facilities. Which include Medical schools in the region in collaboration with other partners including Masinde Muliro University.

Kakamega County prioritizes Maternal and Child Health Care. The impact of free maternity service, which has been rolled out nationally, has made Kakamega county be among the rapid growing counties in Kenya. Tackling the challenge of high maternal and infant mortality rate whereby Sh.100 million has been allocated in this year's budget to address quality maternity services and postnatal care. The Kakamega County General Teaching and Referral Hospital is integral to provision of specialized medical care in the region. A plan to have a modern ICU, acquire a state-of-the-art CT scanner and set up a Renal Unit in order to save lives and reduce referrals to other facilities has been put in place by the county government. The public health facilities have been upgraded to fully provide X-ray services, theatre services, laboratory equipment and rehabilitative services. This has decongested the regional referral hospital and increased access to healthcare. ICT is being embraced in all health facilities to make service delivery more efficient.

Statement of the Problem

According to the Government of Kenya (GOK) and in particular the Ministry of Health (MOH) shows that steady and progressive strides towards making the common citizen access health care have been made. The implication is an increase of the people potentially capable to access health care.

Despite public health services being made accessible and cost friendly to the common citizen in respect to the massive investment being put into the Ministry of Health (MOH) by both the National and County Government the services rendered does not equate in terms of efficiency in public hospitals. As much as the government of Kenya (GOK) in conjunction with the County governments is working tirelessly to provide the resources that are necessary for enhancing; accessible, quality, affordable, acceptable and utilizable services. There is a lot of inefficiency in the ministry of health. For example, the Kenya Medical Practioners, Pharmacists & Dentists Union (KMPDU) had to revert to striking. Making all doctors to down their tools of labor on 5th December 2016 staging one of the longest strikes in the history of Kenya. However, the Kenya Medical Practioners, Pharmacist & Dentists Union (KMPDU) strike was different because they were fighting for the enactment of the Collective Bargaining Agreement (CBA) that was signed between the doctors and the government in June 2013, yet the government had delayed its registration and implementation for a period of three and a half years.

The CBA captures issues varying from doctors' remuneration (a 300% pay rise), promotions, transfer and training of doctors; improved working conditions such as functioning medical equipment, increase of number of doctors and support staff; benefits to doctors such as 'workmen compensation and retirement. The World Health Organization (WHO) 2015 has observed that poor access to health care is often a result of inefficiency by the service providers. In Kakamega County you get into a hospital and find one of two nurses there caring for a ward with 80 patients. This is far from the World Health Organization (WHO) recommended nurse: patient ratio of 1:6/10. The quest to have fully equipped hospitals is constantly hampered by ingrained corruption and government inefficiencies. For example, thirty million Kenya shillings worth of medical equipment was returned to its Swedish donors after the donor declined to pay out two million Kenya shillings of kickbacks to have the consignment cleared at the port in October 2014.

The Cabinet Secretary of Finance Henry Rotich who took office on 15th May 2013 admitted that the reason why the salary and remuneration commission did not want to pay members of KMPDU a decent salary in the public sector is because this would cause a huge shift from private to the public sector, thereby private hospitals would collapse. More than 95% of Kenyans rely on public health facilities, therefore health docket is a public function. Undermining the provision of public health services in the country has resulted to the huge interest of international investors and coming into the country seeking to invest in private healthcare due to its profitability. Our very own private health facilities are also investing billions of shillings in expansions. Does this mean that access to healthcare has become a privilege as opposed to being a fundamental human right? It is with this complexity that necessitated the need to undertake a study to find out what causes inefficiency in the ministry of health.

LITERATURE REVIEW

Empirical Literature Review

Studies have revealed that both public and private organizations have no option of investing in information technology if they have to effectively respond to customer needs in the ever changing environments (Alain Pinsoneault, 2014). Alain Pinsoneault (2014) observed that knowledge sharing among business executives is an important factor in sensing environmental threats before deciding on how to respond. Talon (2011) studied competing perspectives on the link between strategic information communication technology alignment and organizational agility using survey data from ICT and business executives drawn from United States firms. The study revealed that ICT alignment improved firm performance in volatile markets.

The study used ICT compatibility, ICT flexibility, network connectivity and ICT alignment as measurement indicators of the study. The study findings were consistent with (Jesse Jackson 2010) findings that ICT alignment is an important and enduring source of value creation leading to improved organization performance. Other scholars examined the impact of ICT on firm profitability from archival data from 2009 to 2016. The study established that ICT investments had positive impact on revenue growth and profitability. There was no variation across firms in using ICT for cost reduction because firms across the board can easily purchase cost reduction IT infrastructure from vendors and thereby eroding Contract Acts (CA) based on cost reduction solutions.

ICT infrastructure was found to be critical strategic firm resource because ICT investment was positively associated with improved organization performance because it helped to identify better opportunities for establishing distinctive strategic positioning. The study used archival data for five years and hence the findings may not reflect present position. A study by Cecil Murphey (2009) on adoption of ICT by health related medical facilities found that ICT adoption led to significant improvements in: communication between patients and clinicians and between employees in various departments, information storage and retrieval, business efficiency, customer service, stock control, reduction in administration and operation costs, and reduction in work force. The study concurred with Rogers (2013) who found that information technological resources that are compatible with values and norms of the organization are adopted more quickly because they provide higher levels of user satisfaction leading to better service delivery. However the study was based on small and medium health related enterprises and ignored public health institutions which houses many of the health care clients in the health sector.

Muathe&Ofafa (2010) investigated influence of ICT on hospital performance and found that, Reproductive Health Workers (RHWs) used ICT extensively in their job functions leading to faster access to relevant medical information. There was easy exchange of information with colleagues and increased efficiency leading to improved hospital performance and that insufficient knowledge on use of ICTs and constant breakdown of ICT equipments' were the major challenges limiting the potential benefits of ICT infrastructure.

The study used descriptive survey design with a sample of 200 reproductive health workers such as doctors, pharmacists and administrators among others within the health sector in Nairobi, Kenya. Macharia, Ng'eno and Njoroge, 2024 observed that Technology makes agriculture service delivery more effective and efficient with the right human skills.

The study only used respondents from one department and ignored employees from other departments. A study by Sonya (2012) investigated the ICT adoption and implementation benefits in medical centres in Malaysia using a case study of Grumi hospital. The study used nurses as the only respondents with questionnaires as the instruments of data collection. The study found that there was improvement in information storage and retrieval, business efficiency and in daily communication among nurses. However, the study ignored other workers such as doctors, pharmacists and clinical officers among others whose views were critical in assessing the potential benefits of implementation of ICT adoption.

Theoretical Review

The proposed study was anchored on Resource Based Theory and supported by two other theories which include: Dynamic Capability theory; and Institutional Theory.

The Resource Based Theory

The origin of resource based theory (RBT) can be traced way back to the postulations of Penrose (2009) seminal works. Grunert and Hildebrandt (2014) concurred with Penrose (2009) seminal works that the services delivered to clients by an organization is a function of the way resources are used. A number of researchers such as Barney (2011), Peteraf (2015), Mata, Fuerst and Barney (2013) have contributed to the development of Resource Based Theory (RBT). The central premise of the RBT is that firms compete on the basis of their resources and capabilities (Peteraf& Bergen, 2015).

The proponents of this theory proposes that organizations gain competitive advantage by embracing four critical practices which includes: Deploying valuable bundle of resources and capabilities that are inelastic in supply; Creating specific knowledge and skills for human capital; Embracing organizational culture that is difficult to be imitated by competitors; and Developing and implementing strategy that can exploit internal strengths, convert internal weaknesses into strengths and respond to external opportunities (Mata, Fuerst& Barney, 2013; Afiouni, 2014). Studies have revealed that there are three assumptions of resources based theory that are the basis of competitive advantage and includes: Resources and capabilities possessed by firms differ (resource heterogeneity); Resources and capabilities can be sources of Service Contract Act (SCA) if they are significantly distributed across competing firms; and if the skills needed to manage technical and market risks are perfectly immobile (Bordello, Ravarini, Wu & Nigam, 2012). O'Sullivan (2011) argues that according to RBT, organizations should exploit all sources of Contract Act (CA) in order to develop unique strategies which can yield customer value. The RBT provides guidelines that help to determine what constitutes a valuable asset, capability or competence. It addresses the establishing of which resources represent strengths or weaknesses, that is, resources which generate core competences are sources of Service Contract Act (Pearce & Robinson, 2015).

It should be noted that resources have different intrinsic levels of efficiency and this explains why different firms performs differently leading to different outcomes (Peteraf& Barney, 2015). Apart from resource heterogeneity, the other resource characteristics that can help an organization to deliver value to customers are rarity, non-substitutability and inimitability. The RBT was applicable in the study because it shed light on two key areas on how public health institutions can improve service delivery which includes acquisition of valuable resources and capabilities that are uniquely different from those of rival organizations which in this case are the private health institutions and development of organizational capabilities that can articulately acquire, deploy and coordinate Organizational Resources for provision of quality health care.

METHODOLOGY

Research Design: In this study, a descriptive research design was employed in the research. Descriptive research design was appropriate in this study because the study seeked to describe the characteristics of certain groups and make predictions. (Cooper &Schinder, 2011). John Orodho (2005) affirms that descriptive design is useful in describing opinions, beliefs, and knowledge of certain phenomenon in the society.

Target Population: The target population included public hospitals staff in Kakamega County who are registered and licensed by the Ministry of health of Kenya as at 2017. The accessible population was Medical Officers of Health, nurses, and health administrators in Kakamega County where the study was conducted, with a total population of 406 public health workers registered and licensed by the ministry of health in Kakamega County Kenya.

Sampling Design Procedure: The study used simple random sampling technique to select the required sample from the target population of public health workers, drawn from the three strata of Medical Officers of Health, Nurses and Health administrators of the public hospitals in Kakamega County, Kenya. These category of staff were found to be directly affecting the service delivery in public hospitals as per a study conducted by Njeru and Meme in 2008.

Sample size: Based on the total population of 406 public health workers, a sample of size was determined using John Orodho2005 sample size determination table at 30% confidence level. This then was distributed proportionally.

Data Collection Instruments: The study aimed to collect primary data using structured questionnaires which was developed in consultation with experts who included supervisors and lecturers in the school of Humanities and social sciences department of Public Policy and Administration. The questionnaires contained both open and closed ended questions. According to Mugenda & Mugenda 2003 questionnaires are useful tools for data collection since they are easier to administer and analyse on large number of respondents as it helps to save on time spent in data collection.

Validity: To enhance validity of the questionnaire the researcher sought the service of the supervisor on validity and relevance of the questions to the topic under study. The questionnaire was well structured and tested prior to the research study in order to ensure that the research findings were accurate and more valid and changed any ambiguous, awkward or offensive questions as emphasized by Copper and Schindler (2003).

Reliability: A test is reliable only if it consistently measures what it is supposed to measure. When repeated over a period of time the result will remain the same. Reliability remains as the consistency of a research measurement and the degree to which an instrument measures and gives the same results every time it is used under the same condition with the same subjects in the process. It therefore is the repeatability of a research measurement.

Data Collection Procedure: Data was collected using structured research questionnaires with open and closed ended questions. The questionnaires helped in collecting quantitative data (Mugenda and Mugenda, 2003). Data was collected by the researcher with assistance from research assistants in public hospitals staff in Kakamega County using the questionnaire which will have both closed and open ended questions. The researcher also conducted interviews with the sample administrators as they have key information that was needed for the study.

Data Analysis and Presentation: The study employed descriptive and inferential statistics to analyse the data. Hence measures of central tendency and dispersion were used to explore the features in the data on effect of organizational resources on service delivery in the public sector. Inferential statistics was then used to make analyses that were easily generalizable to the whole county. Before data was analysed, the researcher edited the data received to ensure clarity, legibility, relevance and appropriateness in order to ensure for completeness and consistency. This was followed by data coding. The researcher decided to use multiple regression analysis which was useful to generate predicted values of dependent variable from the various independent variables.

Empirical Model: The decided in the current study to use multiple regression model that involved analysing the relationship between the independent variables and dependent variable. Cooper and Schindler (2011) posits that multiple regression analysis is suitable for predicting values of dependent variable where various independent variables are involved. The study used multiple regression model because it involved analysing the effect of a set of independent variables on dependent variable that is, service delivery in public hospitals. The model was used to predict the relationship between organizational resources and their effects on service delivery in public sector. The regression model is indicated below:

$Y = \beta_0+\beta_1X_1+\varepsilon$……..... 1

Where:

Y = Service delivery.

β_0 = Constant

β_1 = Coefficients of independent X1

X_1 = Information Communication technology resources

ε = Error term

The current study measured to what extent each of these ICT affect service delivery in Ministry of Health, Kakamega County.

FINDINGS AND DISCUSSION

Descriptive Statistics

Response Rate

The study involved data collection from public hospitals in Kakamega County, from the respondents Medical officers of health, Nurses and Hospital Administrators. A total of 121 questionnaires were administered to 14 Medical officers of health, 105 questionnaires to Nurses and 2 questionnaires to Hospital Administrators. Out of 121 questionnaires that were distributed, 100 were correctly filled and returned. This represents82.6 percent. According to Mugenda and Mugenda (2003) and Saunders, et al., (2007), a response rate of 50 percent is adequate, 60 percent is good, and 70 percent is very good. Therefore, the response rate of 82.6 percent is very good and hence acceptable for drawing conclusions on the current study.

There was a total of 100 respondents. Of the questionnaires given to Medical officers of health, 71.42% responded; Nurses had a response rate of 83.80 percent, Hospitals Administrators had 100 percent response. Nurses render services more than a third of the employees in population under study. Therefore, the data collected is consistent with the population and can be relied on for unbiased results.

Information Communication Technology Resources

The responses were on the level of agreement or disagreement on statements based on Information Communication Technology Resources. The results are given in Table 1.

Table 1: Extent Information Communication Technology Resources influence Service Delivery in the Ministry of Health

	Response rate in a scale of 1-5					Mean	Std Deviation
Description	Strongly Agree	Agree	Neutral	Strongly Disagree	Disagree		
COMPUTERS							
The use of computers is fully implemented within this hospital	20	40	20	5	15	2.55	1.284
Patients records are stored in computers hence improved security	75	20	5	0	0	1.3	0.557
We are always sensitive to our patients records	25	55	20	0	0	1.95	0.669
Accountability on billing of services rendered	30	40	30	0	0	2	0.775
INTERNET							
Enhanced interaction within the hospital departments	15	17	50	10	8	2.79	1.07
Research on medical advancement is faster on emergency cases using the internet.	12	30	20	8	30	3.14	1.428
The internet is up to date and accessible within the facility	20	25	40	5	5	2.35	1.023
Efficiency in service delivery through the internet to patients needs	10	15	45	10	20	3.15	1.195
Our facility supports technological advancement	15	5	20	40	20	3.45	1.284
AGGREGATE SCORE						2.49	1.032

(Survey data, 2019)

The aggregate score in Table 1 shows that the mean is 2.49 while the standard deviation is 1.032. This is an indication that the respondents agree that information communication technology resources influenced service delivery. The result is supported by the low standard deviation, showing that only a few employees vary in their opinions. However, an aggregate mean of 2.49 agree that More than 90% of the respondents felt that information communication technology resources had improved the record keeping and reduced hustles during billing. Less than 10% of the respondents however, felt that information technology resources are inefficient in service delivery citing unexpected interruptions of the systems. From the response and from the facilities visited it was evident that operations had been digitalized by implementation of the use of computers and internet networking on the services offered. The study also showed that the respondents agreed that counties have invested on ICT (mean=2.49). This implies that ICT is a major strategy of service delivery in counties. This support the assertion of Kimani (2017) that counties have invested in ICT as a way to enhance their service delivery.

Service Delivery at Public Hospitals in Kakamega County

The responses were on the scale of 1 to 5, the extent of agreement on statements based on Physical resources, the results are given in Table 2.

Table 2: Descriptive Statistics on Service Delivery

	Response rate in a scale of 1-5					Mean	Std Deviation
Description	Strongly agree	Agree	Neutral	Strongly disagree	Disagree		
Turnaround time to serve clients has reduced	27	37	18	13	5	2.32	1.15
Waiting time for serving clients has greatly improved	15	50	20	0	15	2.35	0.995
Citizen complaints handling is much faster	22	31	23	13	11	2.60	1.32
There is increased realization of citizen expectations	9	29	46	13	5	2.78	0.998
Citizen Satisfaction has greatly improved	16	31	38	11	4	2.56	1.078
AGGREGATE SCORE						2.48	0.898

(Survey data, 2019)

Results revealed in table 2 above showed that the mean for turnaround time for serving clients was 2.32 while the mean for waiting time for serving clients was 2.35. Additionally the results indicated that the respondents were neutral to the question, citizens' complaints are handled much faster (mean =2.60). Additionally, the results showed that the respondents were neutral to the questions, there is increased realization of citizen's expectations and citizen satisfaction has greatly improved (mean = 2.78 and 2.56). The results showed that the aggregate mean for service delivery was 2.48. This implies that there has been a general improvement in service delivery at Kakamega County. This concurs with the findings of Kalava (2016) that found that service delivery in Kakamega County has significantly improved.

Regression Analysis between Organizational Resources and Service Delivery in Public Sector in Kenya

Table 3: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.956a	0.914	0.91	0.32914

(Survey data, 2019)

a. Predictors: (Constant) ICT resources

b. Dependent Variable: Service Delivery

The study findings revealed that 91.4% of the change in service delivery in public sector can be attributed to ICT. 8.6% of the change in service delivery in public sector are attributed to factors not included in the regression model.

Table 4: ANOVA Model

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	108.708	4	27.177	250.86	.000a
	Residual	10.292	95	0.108		
	Total	119	99			

(Survey data, 2019)

b. Dependent Variable: Service delivery

Results in table above shows that the regression model is suitable for explaining the relationship between ICT and service delivery in the public sector in Kenya. This is evident the p-value 0< 0.05 which shows that the regression model is significant. This is also supported by F-statistics which is much greater than one in the model.

Table 5: Regression Coefficient

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	**Std. Error**	**Beta**	**t**	**Sig.**
1	(Constant)	-0.261	0.132		-1.978	0.051
	Information, Communication and Technology Resources	0.128	0.176	0.125	0.723	0.471

(Survey data, 2019)

The hypothesis suggests that there is no significant relationship between Information, Communication and Technology resources and service delivery in public sector. This hypothesis is accepted since the findings of this study have revealed a non-significant relationship (r = 0.128, p = 0.47), with the ICT resources P value greater than the critical P value of 0.05. The results demonstrate that an increase in one (1) unit in ICT resources will likely lead to an increase in service delivery by 0.128 units. This result implies that public health institutions that invest in ICT resources are not likely to experience increase in service delivery.

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

The objective aimed to determine the extent which the Information Communication Technology resources influence service delivery in the ministry of health. The results indicated that information, communication and technology resources has no significant influence on the service delivery at Kakamega County. This suggests that an investment in ICT does not necessarily results to improve public sector service delivery.

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