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Utilization of Information Communication Technology (ICT) Among Health Care Providers in Gatundu North District of Kiambu County, Kenya

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Abstract
Information and Communications Technology (ICT) has the potential to impact every aspect of the health sector. Whilst health is an increasingly information-intensive sector where ICT adoption can significantly contribute to improved quality of service, efficiency, and accessibility, there seems to be low levels of ICT adoption particularly among the health care providers in Kenya. Most health care providers in Kenya just like other developing countries have inadequate ICT skills related to their professional duties. The aim of the study was to determine the factors affecting the utilization of ICT for health care providers in Gatundu North Sub County. A descriptive cross-sectional design was used in all the public, private, Community Based and Faith Based health facilities in the Sub County. A total of 134 Health professionals including doctors, pharmacists', nurses, public health and other paramedics offering health services in the Sub County were sampled. A total of 134 health professionals were sampled. Questionnaire and an observation checklist were used to collect data. Quantitative data was coded, entered and analyzed using SPSS version 17. Generally, the study revealed low ICT access and utilization among the health in the Sub –County was low. Only 27.6% of the respondents used computers while at work and 72.4% did not. Desk tops were the most provided computers reported by 64.8% while both desk-tops and lap-tops were 24.4% and 10.8% of the respondents mentioned lap-tops only. Majority (95.0%) of the respondents reported lack of computers as the main reason why health workers are not using them. Majority (96.0%) of the respondents reported computers are maintained and repaired by hired technicians while 2.0% said they are repaired and maintained only during supervisions.
However, the respondents identified some valid benefits for computer use, the study revealed only few health workers using computers. This was mostly attributed to lack of computers in the health facilities. Therefore, there is need to provide ICT facilities within the health facilities. There is also need to train the health workers on ICT facilities utilization in order to gain the numerous benefits accrued from efficient and effective utilization of ICT facilities in health care delivery system in the Sub County.

Keywords: Utilization, ICT, Gatundu, Health Care Providers, Facility

1. Introduction
Information Communication Technologies (ICT) such as electronic health records, e-prescribing, decision support systems, electronic management of chronic disease and bar coding of drugs and biological products have been shown to reduce health care costs and medical errors. Electronic prescribing has been shown to reduce errors and improve compliance with managed care formularies [1]. Information Communication and Technology (ICT) knowledge enables health care providers to enhance patient care delivery, as well as the practice and safety of care [2]. Knowing the skill levels of the health care providers would establish the competency levels and hence form a basis for developing the desired skills [2, 3]
Until recently, ICT products available for healthcare providers were mostly designed for large organizations and were costly. Recent advances in technology have made ICT applications more available to primary care physicians in smaller practices. [4] Most hospitals in Kenya have not yet computerized the various health care provision departments. The middle- and functional-level nurse managers do not have a computer in their offices or at

their desks [5]. Studies have shown that doctors and nurse managers had significantly greater access to computers and technical support compared to staff nurses [6]. The use of ICT promotes development and improves services in any organization. It brings changes in today's business environment. Organizational, environmental and cultural factors stand against the good and perceived will of the use of ICTs. When health care providers are not computer literate, utilizing the facility would be a problem. ICT knowledge is a fundamental requisite for efficiency in healthcare provision in the current society. Information Communication and Technology (ICT) knowledge enables health care providers to enhance patient care delivery, as well as the practice and safety of care [2]. Health care providers all over the world are expected to keep pace with ICT developments in order to help them make informed decisions regarding patient care and management [2, 7] Because a user's attitude toward the whole phenomenon of ICT affects his/her willingness to use computers – and hence an organization's ability to move toward a paperless system – it's important to establish the existing attitude of health care providers in order to determine how computerization will be achieved [8]. Knowing the skill levels of the health care providers would establish the competency levels and hence form a basis for developing the desired skills [2, 3]

In Kenya, health care providers include doctors, nurses and pharmacists. Health care providers at different levels influence hospital strategy and plan nursing activities in order to provide a competitive environment [7] For example, administrative tasks (such as filling out forms and processing billing requests) represent a significant fraction of healthcare costs. Health Information Technology could streamline these tasks and significantly decrease costs, as well as reduce personal visits to doctors [9] for those living in remote areas, this often means forgoing an entire day's wage. ICT in healthcare can enable remote consultation, diagnosis and treatment through telemedicine. Information Communication Technology (ICT) revolution brought opportunities and challenges to developing countries in their efforts to strengthen the Health Management Information Systems (HMIS) [10]

The increasing healthcare needs of an aging population, expensive technologies, a shift toward community-based care, the need for improved access, and quality, as well as the desire of people to be more directly involved in decisions about their health represent significant challenges and opportunities in a country like Kenya [10] Health information plays a key role in determining how these challenges are met. Add to these the long list of brick-and-mortar infrastructure gaps, capacity building, training of health professionals who are ICT-illiterate, and the lack of primary healthcare staff, and it is easy to see why the Kenyan healthcare sector offers an array of opportunities for low-cost innovation and the application of technology for improving health outcomes [11].

Whilst health is an increasingly information-intensive sector where ICT adoption can significantly contribute to improved quality of service, efficiency, and accessibility, there seems to be low levels of ICT adoption particularly among the health care providers in Kenya. This observation supports the argument of [9, 10] that there is an obvious lack of empirically rigorous data and focused research on this topic. According to and colleagues [9] most health care providers in Kenya just like other developing countries lack ICT skills related to their professional duties. It is this scenario that has prompted the researcher to carry out this study to find out the factors affecting use of ICT among Health Care Providers in Gatundu North District of Kiambu County [9]

Kenya Vision 2030 advocates for improved service delivery through the use of technology as one of the major driving force. This study attempts to fill the gap in existing literature by considering the fact that developing countries face varied challenges especially in adoption of ICT. Countries like Malawi, India and Nigeria have done series of studies concerning the same but none has been specifically done in Kenya on health care providers. Developing countries are not alike and there is the need to investigate the level of utilization and specific factors influencing ICT adoption among health care providers in Kenya and specifically Gatundu North District of Kiambu County.

Methods

Study Area

Gatundu North district has a total population of 109,458. The population density in the district varies from 82 persons per Kms to 976 persons per Km^2. Administrative divided into two divisions namely Chania and Mangu. The district is located about 1,520m above sea level at the lowest point and 2,280 above sea level at the highest points. The main economic activity in Gatundu North District is agriculture. The place is productive and therefore feeds the neighboring Gatundu market with agricultural commodities.

Study Population

There are 7 public health care facilities in Gatundu North District. These are Igegania sub district hospital with 53 health care providers, Ngorongo Health Centre with 14 health care providers, Mataara Dispensary with 6 health care providers, Gakoe Dispensary with 14 health care providers, Mbichi Dispensary with 6 health care providers, Gachege health center with 5 health care providers and Kieni with 2 health care providers. It also includes 13 private clinics, 1 Community Based Organizations and 2 Faith Based Organizations based in the area. The population of interest in this study included healthcare service providers in both health facilities and community levels. The researcher chose the groups above since they carry out both direct patient care, as well as managerial functions within their units. It is therefore assumed that their views would be more representative of the current ICT utilization and way to increase the same among health care providers both at management levels and for direct care providers

Study Design and Sample Size

The study adopted a cross-sectional descriptive design. From the above target population, we included all the 134 health care providers in the Sub County; 105 from the public facilities, 20 from the private facilities, 5 from Community Based Organizations and 4 from Faith Based Organizations. The sample size was therefore 134.

Data Collection using Structured Questionnaire

We used a self-administered structured questionnaire and an observation checklist. The questionnaires were hand delivered to the respondents and were to be filled within agreed time period. A structured questionnaire is a group or sequence of questions designed to elicit information from an informant or respondent when asked by an interviewer or completed unaided by the respondent. They had closed or

prompted questions with predefined answers. We used both closed and open ended questions for the purpose of the study. This type of data collection tool was appropriate for the study population as the respondents were literate. The questionnaire contained the following areas: demographic variables, computer use, factors affecting ICT use and ways to increase ICT adoption among health care providers. The researcher ensured the validity and reliability of the data collection tool by pre testing of the tools in a neighboring district facility and made all the necessary changes as noted, for quality control purposes.

Data Analysis

The qualitative data was objectively analyzed as per the study variables while quantitative data was coded, keyed in and analyzed using computer software; Statistical Package for Social Sciences (SPSS) Version 17.0. The data we analyzed using descriptive statistics, analysis of variance and Chi square depending on the variables. The analyzed data were presented in form of frequencies tables, bar graphs and pie charts.

Ethical Considerations

Approval from the school and the University to conduct the study was obtained. Further approval from all the health facilities administrators in Gatundu North sub-County was obtained. Full disclosure of purpose of the study to respondents was made, and anonymity was ensured through the absence of names on the questionnaires and not analyzing any identifying information. The respondents were informed of their rights to participate or withdraw from the study without any repercussions whatsoever.

Results

Access to computer

Less than half (41.8%) of the respondents had access to the computer while 58.2% had no access to the computer, Figure 1

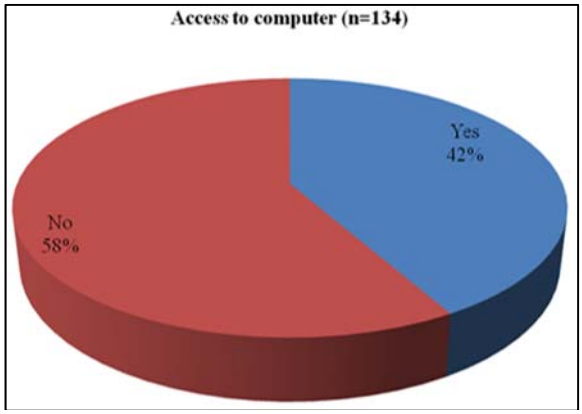

Fig 1: Access to computer

The study indicated that 88.8% of the participants did not own computers while few (11.2%) of the respondents own computers**.** Only 27.6% of the respondents used computers while at work while the rest did not.

Sixty one percent (61.3%) reported computers are used for patient record management, 43.5% said they are reported for sending emails, 40.3% said browsing and data storage while 35.5% said they use it for education continuation, Figure 2

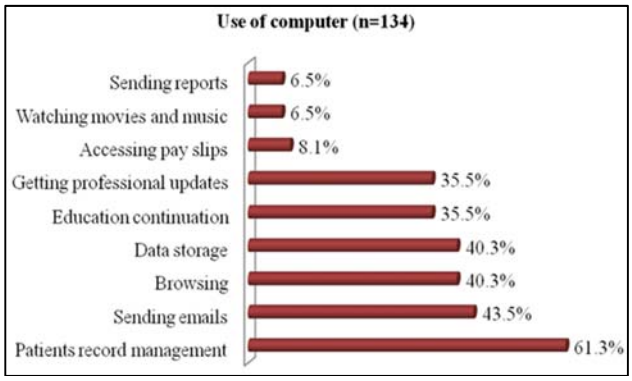

Fig 2: Uses of computer

Types of computers provided

Almost three quarters 64.8% of the participants were provided with desk tops while both desk tops and lap tops were mentioned by 24.4% and 10.8% of the respondents were provided with lap tops only.

A small proportion of 23.9% had trained in computer and 76.1% had no training in computer

Majority (90.6%) of respondents who had trained in computer were trained before joining the service while 9.4% trained while in the service. Most participants (53.1%) never trained in computer because of lack of interest while 20.1% said they lack money to train and 15.8% though computer was not very important. Less than half (5.2%) reported they lacked time to train and 3.0% lacked a training opportunity. When the asked on usage of computer at work, 28% confirmed usage while 72% declined they don't use computers at work.

Computer usage (multiple responses)

All the respondents using the computer used it for typing, 93.5% used it to browse, 32.3% used it to print, 96.8% used computers to send reports and 93.5% used computer for data storage.

All the respondents used MS Word while 19.4% used Power Point. Only 6.5% and 4.9% used Excel and Access respectively.

Reasons for no usage

Majority (32.0%) of the respondents reported lack of computers as the main reason why health workers are not using them while 28.0% reported computer illiteracy as the major reason. Less than three quarters (26.0%) reported resistance to change while 14.0% reported poor computer culture and reported lack of ICT policy in health as the main reason why health workers are not using computers.

Availability of Electricity and internet connection

All the health facilities were connected to the power supply, however most (82.8%) of the respondents reported there was no internet connection in the health facilities while 17.2% reported there was internet connection in the facilities.

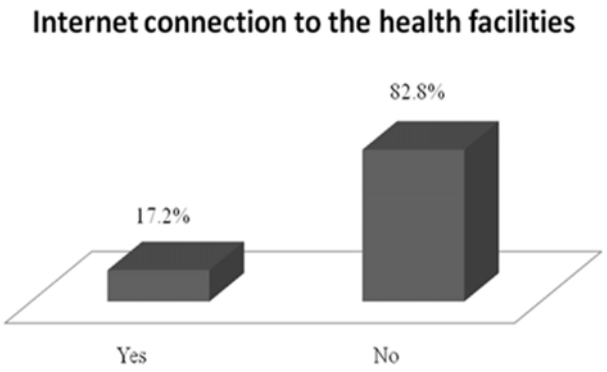

Fig 3: Internet connection

Internet access to medical information

Only 9.7% of the respondents reported they access medical information through the internet while the rest did not.

Of the participants who access medical information, almost half (46.2%) accessed medical updates while 30.8% accessed information on management of new cases, trends in disease outbreaks and adverse drug reaction. Twenty three (23.0%) reported they access information on drug dosage and side effects.

Quality of accessed information and data Security

When asked about the quality of information accessed most (69.2%) of the respondents who uses computers agreed that the accessed information was of good quality while 30.8% disagreed.

Security of data stored in computer

Over half (51.5%) of the respondents agreed that data stored in computers is secure while 48.5% said such data was not secure.

Computer repair and maintenance

Majority (97.8%) of the respondents reported there were no computer maintenance and repair technicians in the health facilities while 2.2% said computer maintenance and repair technicians were present in the health facilities.

Table 1: Computer repair and maintenance

Presence of computer technician	Frequency (n=132)	Percentage (%)
Yes	3	2.2
No	131	97.8

Majority (96.0%) of the respondents reported computers are maintained and repaired by hired technicians while 2.0% said they are repaired and maintained only during supervisions. Table 2

Table 2: Repairs and maintenance of computers

Repaired by hired technicians	Frequency (n=132)	Percentage (%)
Hired technicians	130	96.0
No response	2	2.0
Repaired by during supervision	2	2.0

Time taken to repair computers

When asked of the time taken for damaged computers to be repaired, over half (56.7%) reported that the computer are repaired as soon as possible while 18.0% reported they are repaired after two weeks, 14.2% were not sure after how long are the computers repaired and 8.9 reported after one week.

Table 3: Time taken to repair computers

Presence of computer technician	Frequency (n=132)	Percentage (%)
As soon as possible	76	56.7
After two weeks	24	18.0
Not sure	19	14.2
After a week	12	8.9
After two days	3	2.2

Discussions

The study generally reported low ICT access and utilization among the health workers. This concurs with a study by Kleiner and colleagues [9]. Which reported that, whilst health is an increasingly information-intensive sector where ICT adoption can significantly contribute to improved quality of service, efficiency, and accessibility, there seems to be low levels of ICT adoption particularly among the health care providers in Kenya. According to Kleiner *and colleagues*, most health care providers in Kenya just like other developing countries lack ICT skills related to their professional duties. This is in spite of a report that revealed that, Information and Communications Technology (ICT) has the potential to impact almost every aspect of the health sector [11]. In public health, information management and communication processes are pivotal, and are facilitated or limited by the availability of information. In addition, beyond the formal health sector, the ability of impoverished communities to access services and demand a healthcare system that responds to their priorities and needs can be significantly influenced by broader information and communication processes, mediated by informed decision making. The study revealed equally low access to information using ICT facilities

Most of the health care providers lacked the necessary skills and knowledge to facilitate them to effectively and efficiently offer healthcare services through ICT facilities. This contradicts the ICT argument that, in order to harness the potentials of ICTs facilities in general goes hand in hand with improvement of technological infrastructure, skills development and training, and sensitization for the sponsoring organization. Adequate budgetary allocation must be provided for the purchase of appropriate hardware and software and other accessories; costs of installation, support and maintenance. Health facilities managements should also develop cost models that will sustain investment in e-resources in a way that will even ensure accessibility of information and e-journals across all medical specialties.

The study revealed low capacity to handle ICT technology among the healthcare providers. This is in contrast to Danida (2005) [12] report that indicated that, capacity to adapt information to ensure that it is culturally appropriate and relevant is a major challenge, so too is the capacity to use ICTs effectively, to service and maintain them. A skilled ICT work force is an essential ingredient for the effective use of ICTs in health. Systems professionals and technology products and services providers and project team leaders with high skill levels and experience in working in the sector introducing the ICTs are important components of success [14]

The study revealed the existence of infrastructure such as electricity in the health facilities that can support ICT

utilization. However, other infrastructure such as internet facilities is either underdeveloped or missing in the health facilities. This concurs with Okiy (2005) who points out poor and inadequate facilities; poor level of computer literacy, even within the health care community; poor level of computer facilities; poor level of awareness of Internet facilities and minimum involvement of health institutions in network building challenges mitigation against the use of ICTs [15].

Conclusion

The study revealed low access and utilization of ICT facilities among the health care providers. The study further revealed lack of capacity among the health workers to effectively and efficiently use ICT facilities to bring any meaningful impact in the quality of health services offered. This was evidenced by the small proportion of the health care providers who had received computer training among the health workers. Further to this, those health workers trained in computer were mostly trained before joining the health service a fact that the training receive may not be relevant to ICT application in the context of better health care provision in the health system today. This was largely associated with lack of interest and lack of money for ICT training among the health care providers.

Consequently, a relatively low proportion of the respondents recognized the benefits accrued from ICT utilization in the health care system. Despite the infrastructure development in the health facilities, lack of ICT facilities majored as the main reason that hampered ICT utilization among the healthcare providers. There is also negative attitude among the healthcare providers toward ICT utilization.

The study further revealed there is no trained personnel to maintain and repair the available ICT facilities which may cause delay in service provision or result to further damage to the available ICT facilities

Recommendation

In order to improve access to ICT facilities, there is great need for the ministry of health in corroboration with the facility management teams and other development partners to plan and allocate resources for ICT infrastructure establishment within the health facilities in the Sub County.

The ministry of health and the county government of Kiambu need to be capacity build the healthcare providers on ICT utilization for effective and efficient ICT usage in order to improve the healthcare service provision in the Sub County.

The health care providers needs to have a positive attitude towards ICT utilization in order to be able to embrace it and appreciate its benefits in healthcare provision in the Sub County

There is need to either hire or contract a reliable personnel for timely maintenance, service and repair of the available ICT facilities to avoid delays in service provision and even total breakdown of these facilities due to lack of proper servicing and maintenance of the same.

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