



**EFFECTS OF INTERNET SPEED ON SERVICE DELIVERY: A CASE OF HEALTH CARE SECTOR IN ELGEYO-MARAKWET COUNTY, KENYA**

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**ABSTRACT**

*Broadband Internet access in the healthcare sector worldwide is essential for improvement in service delivery. The extent to which hospitals are connected to broadband Internet varies worldwide. In Kenya, Internet broadband access has been adopted in the healthcare sector but its penetration differs from one county to another. The current study sought to determine the effects of Internet broadband access on service delivery in the health care sector in Elgeyo Marakwet County. The specific objective was to establish how Internet speed affects service delivery in health care. The study adopted the descriptive survey research design. The target population was 240 respondents who comprised of 24 doctors, 40 nurses, 56 management staffs and 120 hospital clients while the sample was 150 respondents who comprised of 15 doctors, 25 nurses, 35 management staffs and 75 hospital clients. Both stratified and simple random sampling techniques were adopted in the study. The data for the study was collected using both questionnaires and interview schedule. The current study adopted content validity, which was assessed on the basis of expert's opinion. Reliability of the research instruments was measured using Cronbach's alpha. Quantitative data collected was analyzed using descriptive statistics, inferential statistics while qualitative data content analysis. The findings revealed that Internet speed had a positive and significant effect on service delivery ( $\beta=0.255, p>0.05$ ). The study concluded that Internet speed affects service delivery in the healthcare sector. This is attributed to Internet transfer technology that is used at the facility affecting Internet speed which in-turn affects service delivery and Internet transfer technology which makes services affordable at the facility. The study recommended that the Communication Authority of Kenya (CA) should consider Internet speed when enhancing Broadband Internet penetration in the healthcare sector in the marginalized counties in Kenya.*

**Key words:** Internet Broadband Access, Internet speed, Service Delivery, Kenya

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## INTRODUCTION

In the healthcare sector worldwide, broadband Internet access is essential for improvement in service delivery. Internet broadband access refers to high-speed Internet access (Chin & Farlie, 2020). According to the Federal Communications Commission (FCC), 92-(2018) broadband refers to connections with download speeds of at least 25 megabits per second (Mbps) and upload speeds of at least 3 Mbps. Carl (2017) posits that broadband refers to high-speed Internet access than others. According to Mehrotra, Huskamp and Souza (2017), the solution to poor service delivery in the healthcare sector across the world can be resolved or mitigated by the use of high-speed Internet where hospitals can offer telemedicine, which is a health care service that is delivered remotely through telecommunications. Mehrotra *et al.* (2017) further posits that its adoption varies across organizations due to access to broadband challenges.

The components of Internet broadband access adopted in this study was Internet infrastructure. Internet infrastructure is an array of telecommunications equipment and technologies used in a network that are necessary for provision of faster Internet (Kelley, 2017). Internet broadband access affect service delivery in the healthcare sector. Broadband Internet access has been significantly embraced in the hospitals worldwide but its use is not the same in all nations (Chin & Farlie, 2020). In the United States, Internet broadband access plays an increasingly important role in the healthcare sector (Clyburn, 2016). Telehealth has been adopted where telecommunications technologies are being used to offer healthcare services. This has helped to revolutionize the services offered by hospitals (Clyburn, 2016). In England, Internet broadband access has been adopted in the healthcare sector where medics have had access to more medical data that has helped them to offer quality services to patients (Lou, Sickles, Huang, Hoogstrate, Cao, Wang & Jahangiri, 2017). It helps to ensure

information about clients as well as their test results can be easily accessed and shared via internet platform and therefore it has contributed to improvement in how service is provided in hospitals. In England, adoption of Internet broadband access has helped medic to consult each other electronically and therefore improves healthcare services quality (Rind, Kohane, Szolovits, Safran, Chueh & Barnett, 2019). In the healthcare sector in England, Internet broadband access has made patients to access consultancy services electronically and it helps patients to be diagnosed while at home (Kohane, Greenspun, Fackler, Cimino & Szolovits, 2016).

In Ghana, Internet broadband access in the healthcare sector has contributed to connection of medical devices with various health applications so as to offer services that are of good quality (Rothstein, Jennings, Moorthy, Yang, Gee, Romano & LeFevre, 2016). It has further resolved shortcomings of rural healthcare delivery in Ghana. Internet broadband access has led to patients being treated at home due to adoption of e-prescriptions among others (Baker, Xiang & Atkinson, 2017). Internet broadband access has enhanced service delivery in the healthcare sector through ehealth, telehealth, digital imaging and eprescription among others (Abekah-Nkrumah, Guerriero & Purohit, 2014). It has enhanced the functioning of health management information systems as well as big data analytics. It is beneficial, as it has cut of costs associated with patients moving from one point to another is need for health services. It has also made patients to get faster treatment at the comfort of their homes (Blusi, Dalin & Jong, 2014).

In Sierra Leone, Internet broadband access has led to the adoption of both Electronic Health Records (EHR) and eprescription (Allsop, Powell & Namisango, 2018). Internet broadband access has contributed to the adoption of Telehealth technologies which has contributed to easy access to health services for those who do not reside in urban setups and therefore it has not only contributed to a reducing strain on hospital

resources but enhancement of service delivery in health facilities (Hanson, Pupilampu & Shaw, 2017). In Rwanda, the government has deployed the Kigali Metropolitan Network, which interconnects all government institutions, which include public health facilities (Ackerman & Strickland, 2018). Internet broadband access has contributed to ehealth solutions such as Onehealth and Health Management Information System (HMIS) among others, which have contributed to an improvement in both quality as well as access to healthcare (Katz & Pantelis, 2019). The adoption of Health Management System (HMS) and Telemedicine among others have contributed to improvement in hospitals (Kantengwa, 2017). Internet broadband access has led to approximately more than 500 hospitals connected to R-HMIS (Musabyimana, Ruton, Gaju, Berhe & Grépin, 2018).

In Kenya, the national government has connected Sixteen (16) Level Four (4) hospitals as well as Five (5) level 5 hospitals to high-speed Internet in a bid to realize Universal Health Coverage (UHC) (Thiong'o, 2020). According to Ochieng (2020), the hospitals are connected to LANs within the hospitals premises and to the National Optic Fibre Backbone Infrastructure (NOFBI) as backhaul for provision of Internet services so as to improve hospital administration service delivery as well as patient care. It has also contributed to improvement in telemedicine. Internet connectivity to these health facilities has helped to enhance prompt service delivery (Thiong'o, 2020). The Kenyan government through Information and Communication Technology Authority (ICTA) has deployed the NOFBI cable to all the 47 County headquarters (Muinga, Sen, Ayieko & Todd, 2015). The NOFBI Cable provides affordable and quality broadband infrastructure. NOFBI deployment together with Universal Service Fund (USF) by Communication Authority of Kenya (CA) facilitates access of Internet broadband services to underserve and un-served areas for healthcare delivery among others (Kang'a, Puttkammer, Wanyee, Kimanga, Madrano & Muthee, 2016). This

has been achieved through enhancement of broadband connectivity as well as reduction of costs for Applications Service Providers and Community Networks and Services offering Internet Service so as to provide rural broadband coverage.

Mutula (2015) posits that Internet broadband access has been adopted in the healthcare sector in Kenya but its penetration differs from one county to another. Internet broadband access has to some extent provided solutions to challenges associated with an efficient health care system in non-urban setups. According to Mugeni, Wanyemi and Wafula (2017), data on consumer satisfaction with Internet broadband services in the health sector has not been well articulated in the literature, this therefore necessitates the need for the Ministry of Health in both National and County governments in liaison with the Ministry of Information, Communications and Technology, Innovation and Youth affairs and other stakeholders in the healthcare sector in Kenya to opt for broadband Internet use in the healthcare sector.

In Elgeyo Marakwet County, high broadband Internet connectivity is witnessed in financial institutions and county government offices (Amdany, Chelagat & Marete, 2020). The county has implemented an Integrated Health management system to link-up Hospitals. However, broadband Internet connectivity is being embraced in education and health sector in Elgeyo Marakwet County but at a slow pace. Statistics from Communications Authority of Kenya (2021) posits that Elgeyo Marakwet County is among the marginalized counties, which has recorded an increase in access to broadband Internet in the North Rift region. In the County, Broadband Internet access is evident among households, businesses, government offices, academic institutions, hospitals, financial institutions and firms in the agricultural sector (Kemoi, Mailu & Kibaara, 2020). As much as broadband Internet access has a great impact on service delivery, little is known about how Internet broadband access affects service delivery in the healthcare sector in



Elgeyo Marakwet County, which the current study seeks to address.

## LITERATURE REVIEW AND THEORETICAL

This chapter entails review of literature on the concept of service delivery, Internet infrastructure, Internet speed and broadband pricing, theoretical and conceptual framework. It also covers gaps and chapter summary.

### Empirical Review

#### Service Delivery in Healthcare sector

Service delivery is the actual provision of services as well as products to the customer or (Roth & Menor, 2003). It is concerned with the location, timing as well as the manner in which a service product is provided to clients. Service delivery of any business entity is very important as it determines the continuity or the collapse of the business entity (Greenhalgh *et al.*, 2004). The way service is delivered to clients by a service provider is of great importance because it contributes to either satisfaction, retention of customers or dissatisfaction as well as loss of customers (Brown & Osborne, 2012). Service delivery of any organization has a great impact on its image. Service delivery is the most important component that can help an organization to achieve long-term competitive advantage (Roth & Menor, 2003).

Health facilities need to know how their customers view their services because it gives them an indication of their public image (Greenhalgh, Robert, Macfarlane, Bate & Kyriakidou, 2004). Health facilities should ensure that the services they give are of high quality so as to keep or maintain the hospitals good reputation. The indicators of service delivery that will be adopted in this study include: quality, affordable, accessible and efficacy. Quality is a long-term commitment by the county government through health facility to provide services that are able to satisfy the needs as well as the desires of customers continuously. The responsibility of offering quality service falls on both the governments, management of the organization as well as its workforce. Quality is

measurable as the customer is able to compare his or her expectations with the values; they get compared to the costs spent.

Quality service delivery is important as well as challenging tasks that hospitals confront with due to its intangibility, unpredictability, inseparability, perishability, as well as labor-intensive nature (Greenhalgh *et al.*, 2004). In the health sector, some clients prefer one hospital to the other on the basis of the quality of services provided at the facility. Affordability is another factor that is considered when accessing service delivery. The services provided should be affordable to the market niche targeted (Pleger, 2000). It should also be accessible to its market niche and the services provided should be efficient. Little is known about service delivery in the healthcare sector in Elgeyo-Marakwet County and hence the need for this study to be done. Service delivery in healthcare sector is affected by many factors but the current study seeks to focus on Internet infrastructure, Internet speed and broadband pricing and how it affects service delivery in the healthcare sector.

#### Internet Speed and Service Delivery

Internet speed is the rate at which data is able to travel from WWW to a computer that is for example at home among others (Straub, 2014). Kbps and Mbps is used to measure Broadband speed. If they are high, it implies that the speed will be fast (Ting, 2015). Broadband or high-speed Internet refers to 100 Mbps for download and 1,000 Mbps or higher on the highest-tier plans for uploads. Broadband Internet is advocated for since it is fast compared to other types (Prasad, 2018). In a hospital setup, Internet speed is very important, as it is the one of the key considerations when choosing service provider for provision of Internet. It helps to determine not only how quickly tasks are performed online but also how many of those tasks your network can handle at a single time (Njoroge, 2020). Internet speed required for an organization or individuals depend on usage and if at the organization, multiple devices are used to access Internet at a time then a faster Internet

speed plan is required (Melville, Kraemer & Gurbaxani, 2014). Slow Internet connection kills business productivity and it can result into missed business opportunities. Organizations require fast Internet speed so as to save on time as well as enhance productivity and efficiency. Fast Internet speed is needed to support multiple users (Ziadi & Knufie, 2016).

The indicators of Internet speed that were adopted in this study include; transfer technology, number of users, connection type and Internet use. Data transfer technology in fixed networks affects broadband speed (Davis, Bagozzi & Warshaw, 2019). The use of Fibre-optic as well as cable networks helps to enhance the speed at which data is transmitted across the Internet platform (Devaraj & Kohli, 2013). Technology used for data transfer therefore has an effect on Internet speed, which affects service delivery (Melville et al., 2014). In the healthcare sector around the globe, few studies exist that have been conducted on data transfer technology and how it affects broadband speed as well as service delivery in the healthcare sector. According to Roztocki and Weistroffer (2014), adding clients to an Internet-connected network can contribute to traffic congestion as well as reduction in access speeds for all users. Internet speed is influenced by number of users (Gatautis, 2018). In practice, the number of users affects Wi-Fi speed because the total available bandwidth on Internet package is shared between all the users and is not a per-person allocation (Gichoya, 2015). This implies that the more the users are connected, the more the available bandwidth has to be shared out and therefore it decreases the speeds each user can get. In Elgeyo Marakwet County, no studies exist that have been conducted on number of users in regards to Internet speed and how it affects service delivery in healthcare sector. The current study sought to address this knowledge gap.

Connection type affects Internet speed this is because different network connectivity's influences Internet speeds (Paletta & Dias, 2018). Internet speed is influenced by use of

advancements in technology (Oliveira & Martins, 2017). Whether cable or wireless connectivity is adopted in an organization, cable Internet connectivity is faster and reliable than a wireless network. Internet usage affects Internet speed, which affects service delivery. If several applications are in operations at the same time, it will contribute to slow Internet (Jay & Webber, 2015). This is due to the fact that various applications are competing for the same Internet (resource). In Nigeria, Adewoye, Ayo and Oni (2019) researched on the impact of IT investment on service delivery in Ladoke Akintola University. Internet use was one of the factors that were considered in the study. The findings revealed that Internet use affects both Internet speed and service delivery in Ladoke Akintola University. The study was not conducted in the healthcare sector. Methodological gaps also exist as no diagnostic tests were conducted in the study. The current study sought to address these gaps. In Elgeyo Marakwet County, no studies exist that have been done on Internet broadband Access. The current study sought to address this knowledge gap.

## **Theoretical Review**

### **Diffusion of Innovation Theory**

The theory was developed by Rogers in 1962. It states that with passage of time an idea spreads and gets embraced within the society. This implies that diffusion has taken place, which contributes, to people embracing a new idea that sometimes has an influence on their behavioral patterns. Internet Broadband access is an innovation whose diffusion helps to improve service delivery. Internet broadband access is an innovation that is meant to increase the quality of Internet services to consumers. It is therefore an innovation whose diffusion in the healthcare sector will help to improve service delivery. When technology is being introduced, it is important to understand those targeted. This will help to improve acceptability of the idea by majority of the people in the society.

It is recognized for its ability to provide an explanation on the process of innovation adoption

since the 1960s. In the healthcare sector, the theory is applicable to adoption of new healthcare information technologies. It applies to adoption of a telehealth program (Helitzer, Heath, Maltrud, Sullivan & Alverson, 2013). It is adopted in e-health projects where it helps to provide more explanation on aspects touching on use of technology. In this study, the theory was adopted to assess adoption of Internet broadband access in the healthcare sector.

## METHODOLOGY

**Research Design:** The study adopted the descriptive survey research design. It describes the situation the way it is and is thus suitable as it allowed the researcher to administer questionnaires and interview schedule so as to collect data (Kumar, 2018). It was suitable for the current study, which

sought to report the situation as is without manipulating the variables.

**Target Population:** It was 240 respondents who comprised of 24 Doctors, 40 Nurses, 40 Clinical doctors, 24 Medical Laboratory Technologist, 16 Pharmacist, 16 Nutritionist or Physiotherapist, 16 Health Records officers, 8 Radiographers or Medical Engineers and 56 management staffs drawn from two county hospitals and six sub-county hospitals. The target population had been arrived at as follows; 3 Doctors, 5 Nurses, 5 Clinical doctors, 3 Medical Laboratory Technologist, 2 Pharmacist, 2 Nutritionist or Physiotherapist, 2 Health Records officers, 1 Medical Engineers or Radiographers and 7 other management staffs in each facility. The target population was as presented in Table 1.

**Table 1: Target Population**

S/NO	Groups	Target size	Percentage
1.	Doctors	24	10
2.	Nurses	40	16.7
3.	Clinical doctors	40	16.7
4.	Medical Laboratory Tech	24	10
5.	Pharmacist	16	6.7
6.	Nutritionist or Physiotherapist	16	6.7
7.	Health records		
7.	Medical Engineers or	16	6.7
8.	Radiographers	8	3.3
9.	Management staffs	56	23.3
<b>Total</b>		<b>240</b>	<b>100.0</b>

Source: County Ministry of Health records (2022)

### Sampling Techniques and Sample size

**Sampling Techniques:** The study adopted both stratified and simple random sampling techniques. The former was used to stratify the respondents into doctors, nurses, management staffs and hospital clients. The groups are organized on the basis of shared characteristics of the members in the group. The latter was used to pick respondents from each group.

**Sample size:** It was 150 respondents calculated using a formula by Yamane's (1967).

$$n = \frac{N}{1 + N(e)^2} = \frac{240}{1 + 240(0.05)^2}$$

= 150 respondents.

For the number of respondents per group this formula is adopted;

$N_h$ =Population size per strata

$n_h$ =sample size per strata

$$n_h = n(N_h/N)$$

**Research Instruments:** Questionnaire and interview schedule were used. The questionnaire was semi-structured in nature while the interview schedule was unstructured and was used to collect data from the hospital clients.

**Pilot Study:** It is done to assess whether the research instruments are well constituted in regards to design and relevance of statements or questions

(Igwenagu, 2016). The pre-test of the research instrument was conducted in Nakuru County. The appropriate sample size for the pilot study is 10% of the sample size (Novikov & Novikov, 2019). The pre-test was conducted on 15 respondents (10% of 150) and it was used to assess both reliability and validity.

### Validity and Reliability

**Validity:** Validity refers to how accurately the statements or survey questions helps to address what is intended (Gupta & Gupta, 2022). The current study adopted content validity, which was assessed on the basis of expert’s opinion i.e., supervisor and others experts on matters Internet broadband access. Their opinions were used to refine the research instrument.

**Reliability:** It was measured using Cronbach’s alpha. A threshold of 0.7 Cronbach alpha was considered. Pandey and Pandey (2021) posit that the cronbach’s alpha co-efficient considered sufficient is the one that is above or equal to 0.70.

The study established that the composite value of Cronbach’s co-efficient was 0.7363 (73.63%). This was above the recommended Cronbach’ alpha co-efficient that is supposed to be above or equal to 0.70. It was as tabulated below.

**Data Analysis:** After collection, data in the questionnaire was sorted to identify questionnaires that were completely filled and those that were

incomplete. Coding was done for those questionnaires that were completely filled before being fed to the SPSS software. It was analyzed using both descriptive statistics i.e., (mean, standard deviation, frequency and percentages) and inferential statistics i.e., correlation and multiple linear regression analysis. Empirical model for the study was as follows

The linear regression model was as follows;

$$Y = \beta_0 + \beta_1 x_1 + \epsilon \dots \dots \dots \text{Equation 1}$$

Where;

- $x_1$  Internet speed
- $\beta_1$  co-efficient of Internet speed
- $\epsilon$  error

Data collected using interview schedule was sorted and analyzed thematically using content analysis and was presented using written narratives.

### FINDINGS AND DISCUSSION

The study issued 150 questionnaires and 141 were returned, however 10 questionnaires were incomplete. This implies that 131 questionnaires were completely filled which was equivalent to 87.3% response rate.

### Results & Discussion

The demographic characteristics adopted in the study include; gender, age bracket, level of education and length of service. Findings were presented in Table 2.

**Table 2: Demographic characteristics**

n=131		Frequency	Percent
Gender	Male	102	77.9
	Female	29	22.1
Age bracket	Less than 20 years	1	0.8
	21-30 years	27	20.6
	31-40 years	70	53.4
	Above 40 years	33	25.2
Level of Education	Diploma	22	16.8
	Bachelor’s degree	77	58.8
	Master’s degree	21	16.0
	Others (specify)	11	8.4
Length of Service	0-5	40	30.5
	6-10	80	61.1
	Over 10 years	11	8.4

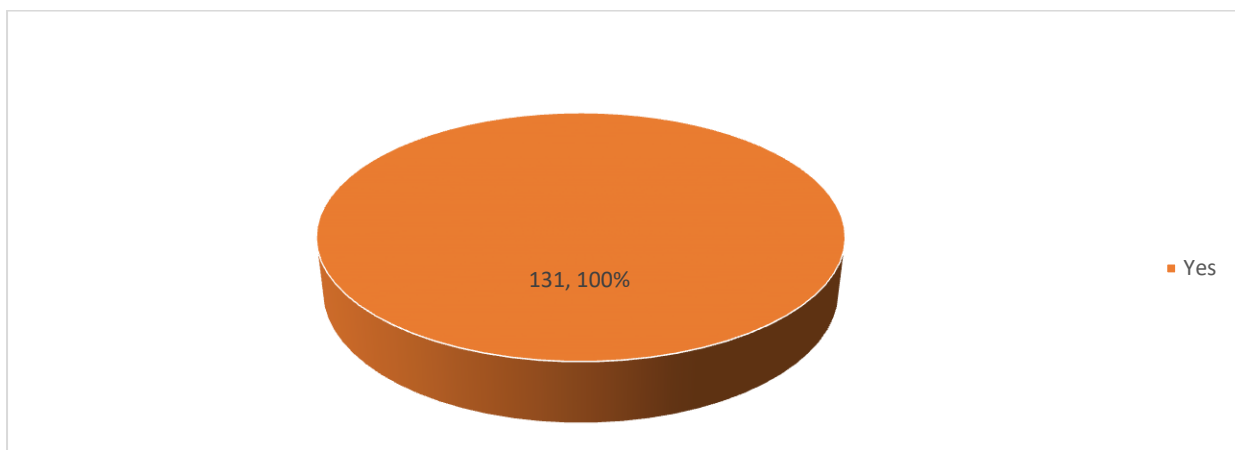


The study sought to determine the distribution of the respondents by gender. From the findings majority of the respondents 102 (77.9%) were male while the least, 29(22.1%) were female. This implies that majority of the respondents in this study were male. The study was also interested in finding-out the age bracket of the respondents, majority of the respondents 70 (53.4%) were aged between 31 and 40 years, 33(25.2%) above 40 years, 27(20.6%) between 21 and 30 years and 1(0.8%) less than 20 years. This implies that all the respondents were aged enough to understand Internet Broadband Access and service delivery service delivery in the health care sector in Elgeyo Marakwet County. In regards to level of education, 77(58.8%) of the respondents had a bachelor's degree, 22(16.8%) had diploma, 21(16.0%) master's degree and 11(8.4%) had other qualifications such as certified public accountants (CPA), PhD and certificate. The level of education is important as it has a great influence on how the respondents comprehend issues on Internet Broadband Access and service

delivery in the health care sector in Elgeyo Marakwet County. In this study, the respondents were all educated and therefore were in the rightful position to provide responses on Internet Broadband Access and service delivery. The study was also interested on the length of service, this was important in-terms of knowhow on Internet Broadband Access and service delivery in the health care sector in Elgeyo Marakwet County. The study established that majority of the respondent's length of service was between 6 and 10 years, 40(30.5%) between 0 and 5 years and 11(8.4%) above 10 years.

### Internet speed and Service Delivery

The specific objective of the study was to establish how Internet speed affects service delivery in health care. The respondents were asked whether Internet speed affect service delivery in the healthcare sector in Elgeyo Marakwet County. Findings are presented in Figure 1.



**Figure 1: Internet speed**

The findings as summarized in figure 1 revealed that Internet speed affects service delivery in the healthcare sector in Elgeyo Marakwet County. All the respondents (131, 100%) stated that Internet speed affects service delivery in the healthcare sector in Elgeyo Marakwet County. One of the respondents interviewed opined that;

*“Internet speed affect service delivery at the facility. The Internet transfer technology makes services affordable at the facility. Internet use has helped to improve how information is shared with other hospitals on need basis and therefore service delivery has improved.”*

The study also further required the respondents to rate their opinion on a 5-point likert scale of the form strongly agree to strongly disagree. The findings are presented in Table 3. The study sought to determine whether Internet speed is affected by the Internet transfer technology used at the facility, which affects service delivery. The item had a mean of 2.3359 and a standard deviation of 1.26862. This implies that most of the respondents agreed that Internet speed is affected by the Internet transfer technology that is used at the facility, which affects service delivery. The findings are similar to that of Ting (2015) that Internet speed is affected by the Internet transfer technology used at the facility and therefore it has an effect on service delivery. On whether the Internet transfer technology makes services affordable at the facility. The item recorded a mean of 1.6718 and a standard deviation of

0.87216. This implies that majority of the respondents agreed that Internet transfer technology makes services affordable at the facility. The study is in agreement with that of Melville *et al.* (2014) that Internet transfer technology makes services affordable. In response to whether despite the fact that many Internet users existed at the facility it did not affect both Internet speed and service delivery. The item had a mean of 1.8702 and a standard deviation of 0.82646. This implies that majority of the respondents revealed that despite the fact that many Internet users existed at the facility it did not affect both Internet speed and service delivery. Findings resemble that of Davis *et al.* (2019) that despite the fact that many Internet users existed at a facility it does not affect both Internet speed and service delivery.

**Table 3: Internet speed**

Statements	N	Mean	Std. Deviation
Internet speed is affected by the Internet transfer technology we use at the facility, which affects service delivery.	131	2.3359	1.26862
The Internet transfer technology makes services affordable at the facility.	131	1.6718	0.87216
Despite the fact that we have many Internet users at the facility it does not affect both Internet speed and service delivery.	131	1.8702	0.82646
Our Internet connection type does not affect both Internet speed and service delivery at the facility.	131	2.3130	1.40375
Internet use at the facility has increased the number of clients we attend to daily at the facility.	131	1.7099	1.13333
Internet use has helped to improve how we share information with other hospitals on need basis and therefore service delivery has improved.	131	2.1832	1.23289
Internet use has helped to improve how we share information with our clients and therefore service delivery has improved.	131	2.1679	0.99346
Overall Mean		2.0360	

In relation to whether the type of Internet connection did not affect both Internet speed and service delivery at the facility. Majority of the respondents agreed that the type of Internet connection affects both Internet speed and service delivery at the facility. The item recorded a mean of 2.3130 and a standard deviation of 1.40375. The study agrees with that of Roztocky and Weistroffer (2014) that type of Internet connection affects both

Internet speed and service delivery. On whether Internet use at the facility had increased the number of clients attended to daily at the facility, majority of the respondents agreed with the statement that Internet use at the facility had increased the number of clients attended to daily at the facility. The item recorded a mean of 1.7099 and a standard deviation of 1.13333. These results are in agreement with that of Gichoya (2015) that

Internet use increases the number of clients attended to daily at health facilities.

The study was interested in determining whether Internet use had helped to improve how information was shared with other hospitals on need basis and therefore service delivery had improved. The item had a mean of 2.1832 and a standard deviation of 1.23289. This implies that majority of the respondents agreed that Internet use had helped to improve how information was shared with other hospitals on need basis and therefore service delivery had improved. The findings are in agreement with that of Adewoye *et al.* (2019) that Internet use helps to improve how information is shared with other hospitals on need basis and therefore service delivery is improved. On whether, Internet use had helped to improve how information was shared with our clients and therefore service delivery had improved. The item recorded a mean of 2.1679 and a standard deviation of 0.99346. This implies that majority of the respondents agreed that Internet use had helped to improve how information was shared with our clients and therefore service delivery had improved. Findings resemble that of Oliveira and Martins (2017) that Internet use helps to improve how information is shared with clients and therefore it improves service delivery. The Internet

speed construct had an overall mean of 2.0360, this implies that Internet speed has a significant effect on service delivery.

#### Descriptive Analysis of Service Delivery

The study focused on service delivery in the healthcare sector in Elgeyo Marakwet County. The indicators of service delivery adopted in this study include; quality, affordable, accessible and efficacy. The respondents were supposed to rate their opinion on the statements in Table 4 on a 5-point likert scale of the form strongly agree to strongly disagree. The descriptive statistics findings are presented in Table 4. The study sought to determine whether service quality had improved since Internet broadband penetration in the facility. The item had a mean of 2.2519 and a standard deviation of 1.51070. This implies that majority of the respondents agreed that service quality had improved since Internet broadband penetration in the facilities. The study is in agreement with that of Greenhalgh *et al.* (2004) that service quality improves due to Internet broadband penetration in the facilities. One of the respondents' interviewed revealed that;

*"The quality of service received at the health facility improved due to the Internet broadband access at the facility."*

**Table 4: Service Delivery**

Statements	N	Mean	Std. Deviation
Our service quality has improved since Internet broadband penetration in the facility.	131	2.2519	1.51070
Broadband Internet penetration in the facility has made our services more affordable at the facility.	131	2.1756	1.32712
Our services are more accessible to the public due to Broadband Internet penetration at the facility.	131	2.0916	1.17964
We attend to our clients more efficiently due to Internet broadband penetration in the facility.	131	2.6031	1.29305
Mean Score	131	2.2806	

On whether, Broadband Internet penetration in the facility has made their services more affordable at the facility, majority of the respondents agreed with the statement that Broadband Internet penetration

in the facility has made their services more affordable at the facility. The item had a mean of 2.1756 and a standard deviation of 1.32712. The findings resemble that of Roth and Menor (2003)

that Broadband Internet penetration makes services more affordable. In regards to whether services are more accessible to the public at the facility due to Broadband Internet penetration. Majority of the respondents agreed with the statement that services were more accessible to the public at the facility due to Broadband Internet penetration. This is because the item recorded a mean of 2.0916 and a standard deviation of 1.17964. The study agrees with the findings of Brown and Osborne (2012) that services are more accessible to the public when there is Broadband Internet penetration.

The study also sought to determine whether hospital clients are attended to more efficiently due to Internet broadband penetration in the facility. The item had a mean of 2.6031 and a standard deviation of 1.29305. This implies that that majority of the respondents agreed that hospital clients are attended to more efficiently due to Internet broadband penetration in the facility. The findings

are in agreement with that of Pleger (2000) that hospital clients are attended to more efficiently due to Internet broadband penetration. The overall mean was 2.2806 which implies that service delivery had improved due to adoption of Internet Broadband Access. One of the respondent's interviewed revealed that;

*“Service delivery efficiency improved due to broadband Internet use at the hospital.”*

### Inferential Statistics

This section presents correlation and regression analysis findings.

### Regression Analysis

Regression analysis is a powerful technique used for predicting the unknown value of a variable from the known value. In this case, regression analysis was used to predict service delivery from Internet speed. The regression model summary was presented in Table 5.

**Table 5: Model Summary**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.925a	.856	.853	1.44517

a. Predictors: (Constant), Internet speed

From the Table above, the value of adjusted R-square is 0.853 which indicates that the model explains 85.3% of service delivery from the predictor variable (Internet speed). Analysis of

variance (ANOVA) was employed to measure the differences in means between service delivery and its predictor variable. The results are shown in Table 6;

**Table 6: ANOVA**

Model		Sum of Squares	Df	Mean Square	F	Sig.
	Regression	253.331	1	84.444	11.117	.000 <sup>b</sup>
1	Residual	964.715	129	7.596		
	Total	1218.046	130			

a. Dependent Variable: service delivery

a. Predictors: (Constant), Internet speed

The F-ratio was 11.117 at 1 degree of freedom which is the variable factor. This represented the effect size of the regression model and the model is significant at 95% confidence level (p=0.000) indicating that service delivery in the healthcare sector in Elgeyo Marakwet County can be predicted

from Internet speed. Regression coefficient analysis was conducted in order to determine the beta that helped to show the extent to which each independent variable affects dependent variable. Findings were as shown in Table 7.

**Table 7: Regression Co-efficient**

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
	(Constant)	6.062	1.274		4.759	.000
1	Internet speed	.255	.138	.284	3.295	.859

a. Dependent Variable: service delivery

Table 7 shows the regression coefficient results where by Internet speed had a positive and a non-significant effect on service delivery in the healthcare sector in Elgeyo Marakwet County of ( $\beta=0.255$ ,  $p>0.05$ ). This implies that an improvement in Internet speed by one unit improves service delivery by 0.255 units. Findings resemble that of Adewoye et al. (2019) that Internet speed had a positive effect on service delivery.

The regression model was as outlined below;

$$y = 6.062 + 0.255x_2 + \varepsilon$$

The constant value of 6.062 implies that at zero, Internet speed, service delivery in the healthcare sector in Elgeyo Marakwet County is at 6.062 units.

### CONCLUSION AND RECOMMENDATIONS

The study concluded that Internet speed affects service delivery in the healthcare sector. This is attributed to Internet transfer technology that is used at the facility affecting Internet speed which in-turn affects service delivery and Internet transfer technology which makes services affordable at the facility. It is also attributed to despite the fact that

many Internet users existed at the facility it did not affect both Internet speed and service delivery, the type of Internet connection that affects both Internet speed and service delivery at the facility. Internet use at the facility that had increased the number of clients attended to daily at the facility and Internet use that helps to improve how information is shared with other hospitals on need basis. The study recommends that the Communication Authority of Kenya (CA) should consider Internet speed when enhancing Broadband Internet penetration in the healthcare sector in the marginalized counties in Kenya. A further study should be conducted on the effects of Internet broadband access on service delivery in the health care sector in Uasin Gishu County, Kenya. The study should consider as measures of Broadband Internet Access besides, Internet speed. This will help to enhance the existing body of knowledge on Internet broadband access and service delivery in the health care sector. Further studies should also be conducted on the effects of Internet broadband access on service delivery in the education sector in Elgeyo Marakwet County, Kenya and other marginalized counties in Kenya.

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