



# **EFFECT OF HUMAN CAPACITY OF A HEALTH FACILITY ON QUALITY HEALTH SERVICE DELIVERED UNDER CAPITATION CONTRACT IN KENYA: PROVIDERS' PERSPECTIVE**

**Priscilla Wangai** 

Chandaria School of Business, USIU-Africa, Kenya  
wangaipriscilla@yahoo.com

**Amos Njuguna**

Chandaria School of Business, USIU-Africa, Kenya

**Joseph Ngugi**

Chandaria School of Business, USIU-Africa, Kenya

## **Abstract**

*Under capitation contract medical scheme, healthcare providers commit to absorb costs associated with unlimited healthcare services that members require and benefit from any profits thereof. The balance between offering quality health services and the provision of human capital resources to deliver these services is a vexing problem. This paper examines the effect of human capacity of a health facility on quality index of health service delivery under capitation contract. Data was collected from 297 health facilities sampled from 1152 health units accredited to offer outpatient primary healthcare under capitation contract by the Kenyan National Hospital Insurance Fund as of July 2015. A Logit regression model was employed in data analysis. The results show that an increase in the number of doctors, clinical officers, nurses and pharmaceutical technologists by one unit increased the index of delivery of quality healthcare by 2.087, 1.068, 1.203 and 1.527 respectively. This finding implies that before accrediting health facilities to provide healthcare under capitation contract, there is need for Kenya National Hospital Insurance Fund to first audit their human capacity.*

*Keywords: Capacity, Capitation Contract, Quality Healthcare, Medical Human Capital*



## INTRODUCTION

The key objective in any finance health scheme is to achieve sustainable quality service delivery (WHO, 2017). A report by Institute for Health Metrics and Evaluation (IHME, 2016) on financing global health revealed that 8.4% of the global economy was spent on health in 2014. The high-income countries spend 11.7% of their GDP on health, while the upper-middle-income, lower-middle-income, and low-income countries spend 5.9%, 4.3%, and 7.3% of their GDP on health respectively. In East African, each economy is struggling to achieve the Abuja declaration commitment of allocating and spending at least 15 percent of the government funds on health (WHO, 2017). Under the long term development plan vision 2030, Kenya government is committed to deliver quality universal healthcare to its citizens hence, in 2011/2012 financial year, adopted capitation payment method to healthcare providers under management of the National Hospital Insurance Fund (NHIF). For each healthcare provider who signs up capitation contract with the NHIF, a fixed prospective amount of money is paid in order to offer unlimited primary healthcare to members allocated to the provider for a period of time. Normally, the payment is determined on a per-member-per-month (PMPM) basis. In exchange of this payment, the healthcare provider commits to absorb the costs associated with the healthcare services the members may require and to benefit from any profits thereof. In so doing the insurer transfers all the risks to the healthcare providers (Kipyegon & Nyarombe, 2015). Consequently a system is created where healthcare providers become micro-healthcare insurers of the registered members. Under this finance scheme, the number of members allocated to a health facility is determined by the members preference of the healthcare provider.

On the other hand, healthcare providers are the sole determinant of the total cost of treatment, level of capacity to utilize and profits that they will accrue from the services provided. Accordingly, the success of achieving delivery of quality health service is dependent on internal capacity management of the healthcare providers. In the health service industry, having capacity to deliver quality health service at minimum cost is essential. Tan and Alp (2009) argue that resources available to the organization determine its capacity. Hence, they defined capacity as the highest possible amount of output that may be obtained in a specific period of time with a pre-defined level of staff, equipments and infrastructure. The concern of healthcare providers in capacity management is to match the level of operations with the level of demand for quality services (Mosadeghrad, 2014).

Quality service is defined as the degree to which the expected service are met (Savsar & Al-Ajmi, 2012; Chahal & Sharma, 2004; Savsar, 2017; Sumathi, 2012). However, according to Pai, and Chary (2016), quality service is described in terms of clients' perception on how well

the service delivered meet or exceeds their expectations. Patients' perception about quality of services provided in a health facility has thus a significant effect on the image of the facility and their loyalty (Mant, 2001; Donabedian, 1980; Andaleeb, 2000). Measures of quality can be classified under service effectiveness which is measured using the outcome and output variables (Donabedian, 1980; Amado & Dyson, 2008). While outcome is about client's satisfaction on services delivered, output is a measure of the capability of the provider to provide the expected services to the clients. This study used the later to measure quality.

The gap between the capacity of a health facility and the demand of quality services by customers results to either under-utilized resources or inadequate capacity leading to unfulfilled customer needs (Karagiannis, 2010). Accordingly, while inadequate capacity can lead to loss of business, excess capacity can drain the health facility's resources and prevent future investments and growth of the facility (Eiriz, Barbosa, & Lima, 2013). Decision on how much capacity to make available in delivery of quality healthcare is complex as it is made the same time it is being utilized. Several researches have hence been conducted; Al-hawary, Alghanim, and Mohammed (2011) found that quality of services and perception about a healthcare provider is associated with skilled professional staff. Rudberg and West (2008) argue that capacity management in health sector has a considerable impact on the quality of the service as perceived by customers. Currie, Chiarella, and Buckley (2013); Cho, Sloane, and Kim (2015) reported that nurses provide cost-effective, quality and accessible care with greater clinical outcomes and patient satisfaction. This study, determined the quality indices of the medical human capacity of a health facility under capitation contract.

## LITERATURE REVIEW

### Theoretical framework

Existing empirical literature provide evidence of existence of economies of scale in the management of health services. The assumption of this theory is that fixed costs do not vary with number of services delivered, hence, the cost per unit of service decreases with increase of scale of services offered. Vanberkel, Boucherie, Hans, Hurink, and Litvak (2012) argued that economies of scale experienced in health facilities are often a consequence of pooling of heterogeneous healthcare services. In terms of capacity of a healthcare provider, better utilization of resources may also arise through employing strategies of spreading fixed costs (Pisano *et al.*, 2001). Based on this theory, the cost of providing health services under capitation contract should thus decrease with increase of the number of members allocated to a healthcare provider. Accordingly, holding all factors constant, the higher the number of allocated members a healthcare provider gets, the lower the unit cost of services delivered. However,

there exists limiting factor to this assumption due to providers' variation in the degree of utilization of existing resources and quality of services offered. One factor that determines validity of capitation contract between a healthcare provider and the insurer is the presence of clinicians, nurses, laboratory technologists, pharmaceutical technologists and their ability to offer quality health services. The type of ownership was considered to be the moderating factor. Figure 1 depicts the conceptual framework of this study.

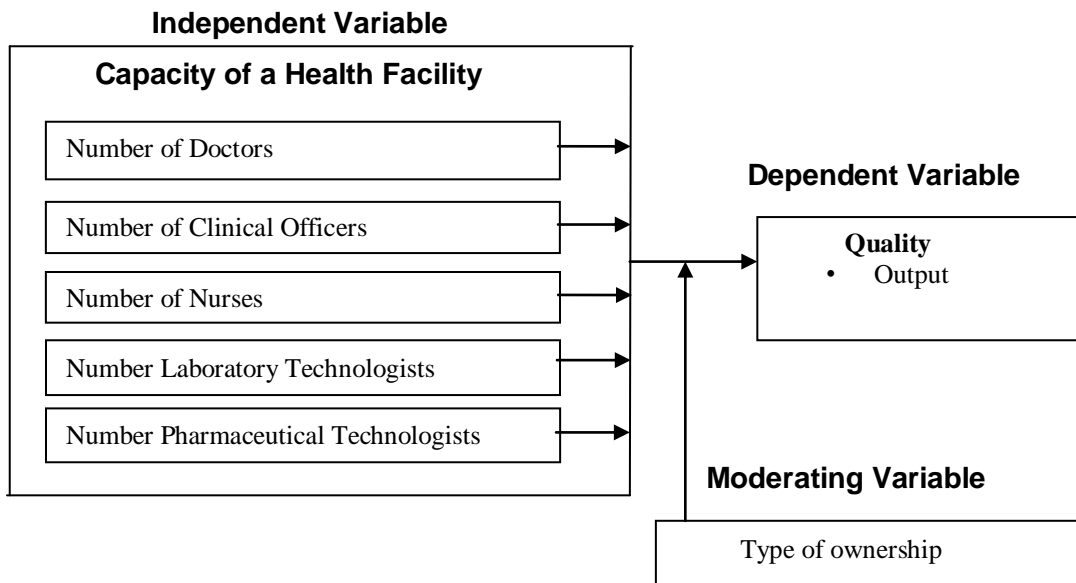


Figure 1: Conceptual Framework

### Number of Doctors

Several studies have linked capacity of healthcare providers and quality of services delivered. Hong and Goo (2004) revealed that quality of service is the health consumers' judgment and is subjective because it lacks tangible evidence associated with the service. Research by Mosadeghrad (2014) that investigated factors affecting quality of medical services provided by Iranian doctors working in various medical institutions revealed that provision of quality healthcare depended on the personal attributes of the doctor and factors pertaining to medical human capacity of a health facility. Karagiannis (2010), investigated the optimal input usage of public hospitals and the capacity utilization of the medical human capacity in Greece. A sample of 53 public hospitals was analyzed using a non-parametric two-stage Data Envelopment Analysis (DEA) method. The results revealed that hospitals were operating with excess capacity of doctors hence underutilized them. The hospitals' capacity perception was high due to skilled professional staff in the hospitals. However, complaints of long waiting time to see the doctors and very expensive medical services were grievances expressed by patients.

### **Number of Clinical Officers**

Clinical officers are mid-level health service providers who are legally qualified medical practitioners. In a health facility, they are mostly the first contact clinicians a patient seeking primary healthcare encounters. Hence, they are expected to have sufficient skills in order to satisfactorily perform basic medical tasks and procedures. Available literatures on performance of clinical officers in health service industry suggest that they play an important role in the day-to-day service delivery. A research done by Khamis and Njau (2014) in Dar es Salaam, revealed that outpatient medical services performed by clinical officers had the highest effect on patients' satisfaction on the perceived service quality. This had a positive influence on patient loyalty to the healthcare provider. Further, a research by Pereira, Cumbi, Malalane, Vaz, McCord, Bacci, and Bergström (2007) in Mozambique documented the quality of healthcare performed by clinical officers. Cross-sectional study of 12,178 surgical obstetric operations performed in 2002 was examined. The results revealed that clinical officers were performing most of these surgeries. The documented outcomes were equivalent to those of specialists.

### **Number of Nurses**

In nursing practice, quality care is reflected as the outcome of the care measured by end result of patient recovery, safety and satisfaction. Available studies done globally have shown that high patient to nurse ratio negatively affect quality of care, patient satisfaction and safety (You et al., 2013; Himmelfarb, & Morlock, 2013; Aiken, Sermeus, Van den Heede, Sloane, Busse, Mckee, & Smith, 2012). According to Brooten, Youngblut, Kutcher, and Bobo (2004), Boyer, Protopopescu, Marcellin, Carrieri, Koulla-shiro, Moatti, and Group (2012), the mismatch between patient flow and staffing levels in health facilities lead to increase workload lowering the outcome of care. Further, Currie, Chiarella, and Buckley (2013) study revealed that nurses provide cost-effective, accessible quality healthcare which is greater or equal to clinicians effectiveness as well as patients satisfaction. Consistent with Currie *et al.* (2013), Cho, Sloane, and Kim (2015) study established that adequate nursing staff decreases deaths and contribute to prevention of healthcare-acquired-infections.

### **Number of Laboratory Technologists**

Laboratory technologists perform complex procedures with numerous processes in and outside a laboratory. Patients results from a laboratory have a significant impact on management of their condition. Accordingly, faulty results may complicate the treatment process leading to poor quality of healthcare services. Available empirical literature has shown that there are a number of errors that occur due to laboratory testing processes (Hammerling, 2012; Hawkins, 2012; Plebani, 2006).

Most of these errors result from the initial testing process and procedures carried out by the laboratory technologists while others are due to system flaws and inadequate inspection of operators (Hammerling, 2012). These errors lower the quality of laboratory service negatively affecting patient management and diagnosis. Using a total of 346 specimens, Kenneth, Stanley, Jackson, and Christian (2017) carried out a descriptive study to determine errors that compromise the quality of laboratory service in a tertiary hospital. The results showed that the frequency of pre-analytical, analytical and post analytical errors were 42.8%, 32.9% and 24.3% respectively.

### **Number of Pharmaceutical Technologists**

Pharmaceutical technologists play an important role in dispensing drugs and providing essential drug information to patients. This minimizes medication errors related to drug administration that may lead to morbidity and mortality in patients receiving them. More than half of all drugs that patients fail to adhere to their administration regimens is because they are either irrationally dispensed, there is poor communication between the patient and the pharmaceutical technologists or inadequate training of the technologist (Ofori-Asenso & Adom-Agyeman, 2016). From other empirical studies, Ayinalem, Gelaw. and Belay (2013); White, Arakelian, and Rho (1999) researches documented the risks of poor quality of pharmaceutical care as; irrational dispensing of drugs to patients, adverse effect on healthcare costs, increased risk of adverse drug resistance and reactions on patients. Biru, Wote, Gemechu, and Fanta (2015) used 5 community pharmacies and 17 drug stores to assess dispensing practices and quality of pharmaceutical service in various drug retail outlets in Ethiopia. Results revealed that irrational dispensing practice such as dispensing of poorly labeled drugs, lack of patient counseling and dispensing wrong drugs frequently occurred. The main causes of dispensing errors were illegible prescription and lack of adequate training of drug dispensers. This practice in return had a negative effect on quality of healthcare provided to patients.

It is evident from the above citations that the quality of health services delivered in a health facility predominately depend on the number of doctors, clinical officers, nurses, laboratory and pharmaceutical technologists available. It is therefore a worthy task to determine the quality index of the medical human capacity of a health facility under capitation contract. This is the motive of this research work.

## **RESEARCH METHOD**

### **Research Philosophy**

In pursuit of the need of using scientific processes in deducing the quality indices of medical human capital of a health facility, a philosophical view of positivism was adopted.

## Research Design

In consideration of the nature of the decision variables, this study employed a cross-sectional research design. The design allows the researcher to analyze the effect of individual variable on the dependent variable, establish the relationship between the decision variables and test the significance of these relationships on the dependent variable at one instant with no further follow-up of the respondents (Creswell, 2014).

## Population and Sampling Technique

The study population comprised of 1152 health facilities that were accredited by NHIF to provide outpatient services under capitation contract as of 1<sup>st</sup> July 2015. Due to the heterogeneity and diversity of the population, the study population was classified into seven geographical clusters. Simple random sampling technique was then used to select a sample of 297 health facilities proportionate to the number of units in each cluster which was calculated using Yamane's (1967) formula:

$$n = \frac{N}{1+Ne^2} \quad (1)$$

## Method of Data Collection

Closed-ended questionnaires were used to collect primary data from the officers in-charge of the sampled health facilities while secondary data was obtained from the existing records. The questions were definite, concrete and pre-determined capturing information on both independent and the dependent variables (Kothari & Garg, 2014). A positive response rate of 81% was attained. To test for reliability of the research instruments, the test-retest technique was used where the researcher administered the same questionnaire to the respondents on two occasions within a relatively short period of time. The ratio of coefficient of variation between the two data sets was close to 1.0 for most of study variables. This implied that the research instruments were reliable. Content validity was ascertained by subjecting the research instruments to two experienced medical administrators practicing capitation.

## Data Analysis

Data was analyzed using descriptive statistics to bring out distinctive characteristics of the sample. Several diagnostic tests for the independence of the independent variables were conducted: Multicollinearity tests, Pearson Chi-Square, Nigelerke Pseudo R-Squared, Hosmer and Lemeshow Test of Goodness of Fit. Logit regression model was constructed to



demonstrate the relationship between the medical human capital capacity and delivery of quality service index under capitation contract.

### **Ethical Considerations**

Research participation was voluntary. The researcher also ensured that the information gathered from the respondents confidential and only used for purposes of the research. All other statutory requirements for data collection were duly satisfied.

## **RESULTS**

### **Descriptive Analysis**

#### ***Number of Doctors***

Table 1: Distribution of Number of Doctors in Respect to the Type of Ownership

Type of Ownership	Doctors				Total
	0	1-4	5-8	>8	
Public	7.7%	38.5%	15.4%	38.5%	100.0%
Private for profit	15.5%	48.7%	23.5%	12.3%	100.0%
Private not for profit	32.5%	37.5%	25.0%	5.0%	100.0%

The results revealed that some of the health facilities were operating without medical doctors as shown in Table 1. Further, Pearson Chi-Square test of independence of the number of doctors against type of ownership was performed at 5% level of significance. The Pearson Chi-Square Value was 12.517, with p value of 0.006 at 3 degrees of freedom. It was therefore evident that the number of doctors was dependent on the type of ownership of the health facility.

#### ***Number of Clinical Officers***

Table 2: Distribution of Clinical Officers in Respect to Type of Ownership

Ownership Type	Number of Clinical Officers				Total
	0	1-3	4-6	> 6	
Public	0.0%	23.1%	38.5%	38.5%	100.0%
Private for profit	8.6%	51.9%	31.0%	8.6%	100.0%
Private not- for profit	7.5%	55.0%	10.0%	27.5%	100.0%



The results revealed that none of the public facilities lacked a clinical officer, however, a significant number of facilities in private for profit and private not-for profit operated without clinical officers. Chi-Square test conducted to examine the independence of clinical officers against type of ownership indicated that there is an association between the number clinical officers and type of ownership.

### **Number of Nurses**

Table 3: Distribution of Number of Nurses in Respect to Type of Ownership

Type of Ownership	Number of Nurses				Total
	0	1-5	6 -10	> 10	
<b>Public</b>	0.0%	15.4%	7.7%	76.9%	100.0%
<b>Private for profit</b>	5.3%	46.5%	26.7%	21.4%	100.0%
<b>Private not-for profit</b>	2.5%	47.5%	20.0%	30.0%	100.0%

From the distribution of number of nurses at the health facilities, all public facilities had at least a nurse. However, a few facilities in private for profit and private not-for profit were operating without a nurse as shown in Table 3. Chi-Square test on the independence of number of nurses against type of ownership revealed that there is no association between the number of nurses and the type of ownership.

### **Number of Laboratory Technologists**

Table 4: Distribution of Laboratory Technologists in Respect to Type of Ownership

Type of Ownership	Number of Laboratory Technologists				Total
	0	1-3	4-6	> 6	
<b>Public</b>	7.7%	46.2%	23.1%	23.1%	100%
<b>Private for profit</b>	5.9%	76.5%	15.0%	2.7%	100%
<b>Private not for profit</b>	5.0%	70.0%	10.0%	15.0%	100%

Some healthcare facilities were not offering laboratory services hence no laboratory technologist employed. The findings are as demonstrated in Table 4. To determine independence of laboratory technologists against type of ownership, Chi-Square test was conducted. It was established using Chi-Square test on independence that there is an association between the number of laboratory technologists and the type of ownership.

**Number of Pharmaceutical Technologists**

Table 5: Number of Pharmaceutical Technologists in Respect to Type of Ownership

Type of Ownership	Number of Pharmaceutical Technologists				Total
	0	1-3	4-6	>6	
Public	7.7%	46.2%	38.5%	7.7%	100.0%
Private for profit	27.8%	58.8	11.2%	2.1%	100.0%
Private- not for profit	25.0%	52.5%	12.5%	10.0%	100.0%

Dispensing of drugs to out-patients is one of the requirements in capitation contracting, nevertheless, descriptive analysis revealed that a significant number of the facilities in public, private for profit and private not- for profit were operating without a pharmaceutical technologists as shown in Table 5. Chi- square test of independence of pharmaceutical technologists against type of ownership revealed that there is no association between them.

**Regression Analysis**

A logit regression model was used to analyze the data. In this study, quality of health service index was measured in terms of output of services delivered under capitation contract. In the analysis of the effect of moderating variable, profit making facilities were considered as the based category.

Table 6: Regression Analysis on Effect of Capacity of a Health Facility on Quality Health Service Delivery

Elements of Capacity of a Health Facility	Statistics		
	B	Sig.	Quality-index (Odds)
Number of Doctors	.736	.035	2.087
Number of Clinical Officers	.066	.024	1.068
Number of Nurses	.185	.042	1.203
Number of Laboratory Technologists	.137	.757	.872
Number of Pharmaceutical Technologists	.423	.005	1.527
Type Ownership (Base Category = profit making)	-1.548	.019	.213
Constant	3.045	0.006	21.01

The medical human capital was used to measure capacity of a health facility whereas, quality health service delivery was measured from perspective of output. Regression analysis results revealed that at 5% level of significance, the number of doctors had a significant effect (p-value

= 0.035). The quality index was 2.087 implying that an increase in the number of doctors by one unit would increase the odds of delivering quality healthcare by 2.087. The results further revealed that at 5% level of significance, the number of; clinical officers, nurses and the pharmaceutical technologists were also significant on delivery of quality health services under capitation contract with p-values of 0.024, 0.042 and 0.005 respectively. The quality indices for clinical officers and nurses were 1.068 and 1.203 respectively. This implied that an increase in the number of clinical officers by one unit would lead to a 1.068 increase in delivering quality healthcare whereas an increase in the number of nurses by one unit would increase the odds of delivering quality healthcare by 1.203. The corresponding quality indices for the pharmaceutical technologists was 1.527, implying that an increase in the number of pharmaceutical technologists by one unit in a health facility would lead to a 1.527 increase in quality of healthcare delivered under capitation contract. However, the number of laboratory technologists was not statistically significant as revealed in Table 6. Further, the effect of the moderating variable, type of ownership, had a negative effect on quality of health services delivered under capitation contract. The results revealed that the coefficient was -1.548 with a significant p-value of 0.006 at 5% level of significant and a corresponding odds ratio of 0.213. This implied that non-profit making health facilities were 0.213 less likely to be effective in delivering quality health services under capitation compared to profit making facilities.

The regression equation of the analysis is as shown in equation 2.

$$E_{Quality} = 21.01 + 2.087x_1 + 1.068x_2 + 1.203x_3 + 1.527x_4 + \varepsilon \quad (2)$$

Where,  $x_1, x_2, x_3, x_4$  and  $\varepsilon$  respectively represent number of doctors, clinical officers, nurses, pharmaceuticals technologists and the error term.

## DISCUSSION OF RESULTS

Capacity is the capability of a service organization to accomplish its purpose over a specified time period (Alp & Tan, 2006). According to Haj-Ali, Bou Karroum, Natafqi, and Kassak (2014), capacity of a health facility is positively correlated to several characteristics such as teaching status, presence of specialized units, expertise of the staff and availability of adequate resources. From the study of Al-hawary *et al.* (2011) on quality of healthcare services provided by King Abdullah Educational Hospital, quality of services and perception about the hospital was high due to skilled professional staff in the hospital. The elements that were considered to describe the human medical capital of a health facility were; number of doctors, clinical officers, nurses, laboratory technologists and pharmaceutical technologists. In this study, quality of health service index was measured in terms of output of services delivered under capitation

contract. The study findings revealed that the number of doctors had a positive and significant effect on the quality of health services provided. This was attributed to the fact that an increase in the number of doctors resulted to increase of skilled services offered and thus an increase in the quality of healthcare services delivered. Consistent with this study findings, Hibbard *et al.* (2001) in their study on mode of payment, provider practice characteristics, and doctors' support for patient self care revealed that doctors working under capitation contract were more motivated to improve quality of healthcare by ensuring that they promoted patient self-care hence reduced frequency of hospital visits.

In respect to clinical officers, the findings of this study revealed that the number of clinical officers in a health facility had a positive and significant effect on the quality of health services delivered under capitation contract implying that adequate clinical officers in health facility enhanced quality of health services provided. Clinical officers are usually the first contact clinician a patient seeking primary healthcare encounters hence can be assumed to explain this finding. The regression report of this study showed that the number of nurses deployed in a health facility had a positive and significant effect on the quality of health services delivered under capitation contract. This perhaps can be explained by the fact that in health service delivery, the output of nurses' work is care effectiveness (Currie, *et al.*, 2013). Cho, *et al.* (2015) studies concurred and demonstrated that adequate nurse staffing decreases deaths and contribute to prevention of healthcare-acquired-infections. Access to essential medicines for primary healthcare and their availability at the points of care is managed by the pharmaceutical technologists and influences healthcare-seeking behaviour by patients (Michael & Trevor, 2011). The current study findings showed that the number of pharmaceutical technologists had a positive and significant effect on quality health service delivery implying availability of drugs was a significant factor in determining quality of health service delivery under capitation contract. Consistent with the findings of this study, Akashi, Yamada, Huot, Kanal, and Sugimodo (2004) investigated the effects of introducing pharmaceutical technologists in management of medicines in Cambodia. Their findings demonstrated a subsequent 10% increase in medicines availability and, 30% in medical materials. However, Al-hawary *et al.* (2011) study revealed that quality of health services delivered in King Abdullah Educational Hospital was insufficient due to the limited number of pharmaceutical outlets which were managed by of pharmaceutical technologists. Other researchers (Ferrier, Hervé, & Valdmanis, 2009) have shown that there exists a strong and positive correlation between the capacity of medical human capital of a health service organization and quality of service delivered. There is therefore consensus that human capacity of a health facility has significant positive impact on quality of services provided.

## CONCLUSION

The research findings showed that the number of doctors, clinical officers, nurses and the pharmaceutical- technologists had a positive and significant effect on the delivery of quality health services under capitation contract. From provider perspective, an increase in the number of medical human capital increased quality of health services delivered under capitation contract. Accordingly, this study recommends that before accrediting health facilities to provide healthcare under capitation contract, there is need for Kenya National hospital Insurance Fund to first audit their human capacity for the purpose of ensuring quality healthcare will be delivered.

## SCOPE FOR FURTHER STUDIES

1. The current study, considered effect of human capacity of a health facility on quality health service delivery under capitation contract in Kenya from providers' perspective. It is recommitted that a study that considers clients perspective be undertaken.
2. The current study considered the effect of human capacity on quality of health service delivery. The scope can be broadened by carrying out a study that incorporates the non-human capital of a health facility.

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