

EFFECTS OF QUALITY MEDICAL LABORATORY SERVICES ON WORKERS PRODUCTIVITY IN STATE HOUSE CLINIC ASO ROCK, ABUJA

Titus-Okpanachi Akuchinyere Onyinyechukwu and Prof. Ngozi Ejionueme

Department of Business Administration, Faculty of Management Sciences, Enugu State University of Science and Technology

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Abstract: *The study explored the effect of quality medical laboratory services on workers' productivity in the State House Clinic, Abuja. The study defined some research objectives, questions, and hypotheses. Data was collected through primary and secondary sources. The study used stratified random sampling as the study population was not homogeneous, as it consisted of 29 Doctors, 17 Nurses, 18 Clinical Officers, 14 Laboratory Scientists/Technicians, and 12 Pharmacists, making it the most appropriate sample to come up with the target sample. Data collected were analyzed using the normal frequencies, percentage, and chi-square test. Results showed that Employees' capacity influences the provision of quality medical laboratory services in State House Clinic, Abuja ($X^2=60.6 > x^2 = 9.488$). The adoption of technology has a significant effect on quality medical laboratory service delivery in the State House Clinic Abuja ($X^2=57.3 > x^2 = 9.488$). The study concluded that quality medical laboratory services have a great effect on workers' productivity. The study recommended government comprehensively address all the issues of concern in the public health sector. Quality indicators in laboratory medicine that can evaluate and improve the health care system should be initiated.*

Keywords: *Laboratory, Medical, Productivity, Services, Workers*

1.1 Introduction

The health sector is one of the most dynamic sectors, which has changed dramatically in recent years due to changes in patient expectations, quality health services, social models, public policies, and technological progress (Sorescu *et al.*, 2008). Success in modern healthcare delivery worldwide depends on the accuracy and efficiency of diagnostic services rendered by biomedical scientists. Patients' lives and the treatment they receive depend on biomedical scientists' valuable skills and knowledge. They carry out a range of laboratory and scientific laboratory tests that play a pivotal role in diagnosing and treating diseases. Their helpful service is the key to the effective functioning of many

clinical departments, including the accident and emergency (A&E) departments. They play a key role in the diagnosis of diseases such as anemia, diabetes, malignancies, emergency blood transfusion services, meningitis, hepatitis, chronic liver disease, chronic kidney disease, hematological malignancies, hemoglobinopathies, coagulation disorders, HIV and AIDS (Erhabor and Njemanze, 2014).

They also use computer-based laboratory information management systems (LIMS) and other highly sophisticated automated equipment employing a wide range of complex modern scientific techniques to carry out varied, efficient, and analytical tests on blood, body fluids, and other biological materials, including tissue samples in a bid to ensuring an excellent laboratory service delivery.

Areas of specialties in Biomedical Science include hematology, blood transfusion science, medical microbiology, virology, clinical biochemistry, immunology, histology, cytology, andrology, and reproductive science (Erhabor and Njemanze, 2014). Therefore, accurate and timely medical laboratory testing and diagnosing are essential to a high-quality medical laboratory system. Quality medical laboratory services are the epicenter of the healthcare sector (Chawla *et al.*, 2010). Delivery of quality service has a significant relationship with customer satisfaction, retention, loyalty (Boshoff and Gray, 2004), costs, profitability (Irving and Dickson, 2004), service guarantees, and organization growth (Kandampully and Butler, 2001).

However, the poor state of medical laboratory service in some hospitals in Nigeria has resulted in high turnover and weak morale among staff/workers, making it challenging to guarantee 24-hour coverage, resulting in problems with patient care, increased cost of operations due to inefficiencies (Owino and Korir, 1997) leading some patients to look for an alternative provider and to spread negative word of mouth which affects potential patients hence growth of the hospital (Tam, 2005). Increasing productivity is one of the fundamental challenges of life sciences research. The work is complex, lengthy, and costly, and the failure rate is high. However, successful research can lead to disease-beating medicines and significant financial rewards for the research organizations involved. In the past, companies have tried to improve productivity through extensive, top-down initiatives, such as reorganizing research or investing heavily in new technology platforms (Beards *et al.*, 2009). No known study has investigated the factors affecting quality laboratory services in the health sector. Therefore, this study explores the factors affecting the quality of medical laboratory services and their effect on workers' productivity in Nigeria.

1.2 Statement of Problem

Laboratory services are the cornerstone of health care programs, as laboratory test results directly influence 70% of clinical decision-making. Quality medical laboratory services are recognized globally; quality and reliability are essential for appropriate case management.

Poor quality of laboratory services and unreliable test results can lead to inappropriate actions or inaction, such as over- or under-treatment, when healthcare providers act upon inaccurate laboratory results. In an era of potential and infectious disease epidemics or pandemics, laboratory facilities of poor quality or limited capacity may lead to a severe under-detection of disease cases, allowing epidemics to gain a critical mass and spread.

Poor performance and productivity result from too few staff or staff not providing care according to standards and not being responsive to the needs of the community and patients. Most performance problems can be attributed to unclear expectations, skills deficits, resource or equipment shortages, or a lack of motivation (Hughes *et al.*, 2002). These causes are rooted in a failing health system, low salaries, difficult working and living conditions, and inappropriate training. This situation is further worsened by the patient's or customer's perception of functional issues which they perceive and interact with during seeking treatment, such as physical facilities, internal process, interactions with doctors, nurses, and other support staff as poor and unresponsive (Boshoff and Gray, 2004; Algilanan and Connor, 2003).

1.3 Objectives of the Study

The main objective of this study is to determine the effect of quality medical laboratory services on workers' productivity at State House Clinic, Abuja. The specific objectives of this study are as follows:-

- i. To determine the influence of employees' capacity on providing quality medical laboratory services.
- ii. To determine the effect of adopting technology on quality medical laboratory service delivery.

1.4 Hypotheses of the Study

- i. Employees' capacity does not influence the provision of quality medical laboratory services.
- ii. Technology adoption does not affect the quality of medical laboratory service delivery.

Literature Review

2.1 Conceptual Review

Quality, as defined by the International Organization for Standardization, is a relative concept. If a service's inherent characteristics meet the customer's requirements, it can be rated high quality (Reinartz, 2004). In a service industry like healthcare, the patient's experience plays a crucial role in rating and assessing the quality of services. Quality in healthcare may comprise newer technology, newer and effective medication, higher staff-to-patient ratios, affordability, efficiency, and effectiveness of service delivery (Tam, 2005). The health sector comprises the public system with major players, including the Ministry of Health and parastatals organizations, and the private sector includes private for-profit, Non-Governmental Organizations, and Faith-Based Organizations facilities (Rok, 2010). In the healthcare industry, service quality has become imperative (Ennis and Harrington, 2001) in

providing patient satisfaction because delivering quality service directly affects customer satisfaction, loyalty, and financial profitability of service businesses.

In healthcare, service quality can be broken down into two quality dimensions: technical quality and functional quality (Dean and Lang, 2008). While technical quality in the health care sector is defined primarily based on the technical accuracy of the medical diagnoses and procedures or the conformance to professional specifications, functional quality refers to how the health care service is delivered to the patients. The Organization for European Economic Cooperation formally defined productivity as: “the quotient obtained by dividing output by one of the factors of production. In this way, it is possible to speak of capital productivity, investment, or raw materials according to whether output is being considered about capital, investment or raw materials, etc”. It must be noted that productivity is a relative concept with comparisons either being made across time or between different production units. Productivity is represented

$$\frac{\text{Output obtained}}{\text{Input expended}};$$

where unit of measurement of both outputs and inputs is given in dollar values (NZD\$) or in any other relevant unit.

A productivity index is defined as the ratio of an output index to an input index, that is:

$$A^t = \frac{Q^t}{I^t}; t = 0 \dots T$$

Where is a labour productivity index, Q^t is an output index and I^t is a labour input index. Each index represents accumulated growth from period 0 to period t.

Some of the most common index formulae (Laspeyres, Paasche, Fisher, and Tornqvist) are included here. Suppose information on prices and quantity of I outputs is available for period $t = 0 \dots T$.

Denote the price and quantity vectors as $p^t = (p_1^t, \dots, p_I^t)$ and $q^t = (q_1^t, \dots, q_I^t)$ respectively; the

Laspeyres (L^t), Paasche (P^t), Fisher (F^t), and Tornqvist (T^t) quantity indices are defined as follows:

$$L^t = \frac{\sum_i p_i^0 \times q_i^t}{\sum_i p_i^0 \times q_i^0}$$

$$P^t = \frac{\sum_i p_i^t \times q_i^t}{\sum_i p_i^t \times q_i^0}$$

$$F^t = (L^t \times P^t)^{\frac{1}{2}}$$

$$T^t = \prod_i \left(\frac{q_i^t}{q_i^0} \right)^{\frac{1}{2} \times (w_i^0 + w_i^t)}$$

$$w_i^t = \frac{p_i^t \times q_i^t}{\sum_i p_i^t \times q_i^t}$$

For $t = 0, \dots, T$ and $i = 1, \dots, I$ and where

Of these, the Tornqvist and Fisher index formulae are the most widely used by statistics officials around the world.

Health Sector in Nigeria

The health sector in any country has been recognized as the primary engine of growth and development. But despite the laudable contributions of the health sector to economic development, the Nigerian health sector has witnessed various turbulence that has negatively reversed the progress recorded at different times. Nearly 15 percent of Nigerian children do not survive to their fifth birthday. Two leading causes of child mortality are malaria (30 percent) and diarrhea (20 percent). Malnutrition contributes to 52 percent of deaths of children under five. A household survey conducted by the government in 2003-2004 showed that 54.4 percent of the population is poor, with a higher poverty rate in rural area of 63.3 percent (HERFON, 2006). The incidence of poverty in Nigeria is widespread and increasing with some of the worst poverty linked health indicators in Africa. There has been a sharp increase in poverty from 1992 to 1996, with an estimated third of the population living below \$1 per day and nearly two thirds below \$2 per day (FMoH, 2005).

Some of the factors that affect the overall performance of the health system include; inadequate health facilities/structure, poor human resources and management, poor remuneration and motivation, lack of fair and sustainable health care financing, unequal economic and political relations, the neo-liberal economic policies of the Nigerian state, corruption, illiteracy, very low government spending on health, high out-of-pocket expenditure in health and absence of integrated system for disease prevention, surveillance and treatment, inadequate mechanisms for families to access health care, shortage of

essential drugs and supplies and inadequate supervision of health care providers are among some of the persistent problems of the health system in Nigeria.

Health Workers' Behaviour

Health workers' behaviour is a critical area of study within healthcare, as it significantly impacts patient outcomes, team dynamics, and overall healthcare delivery. This literature review synthesizes findings from recent studies focusing on the personality traits, behaviour styles, and emotional intelligence of health professionals, which are essential components influencing their behaviour in clinical settings (Clark et al. 2020). The determinants of health workers' behaviour (in the workplace) are rooted in factors relating to:

- a) Macro level, or the overall health system, such as resource allocation, planning and deployment of health workers, current regulatory framework, communication and decision-making processes, and accountability mechanisms. These can be influenced by policy-makers and planners in the health sector, as well as other stakeholders at national level, such as the ministry of finance, ministry of education, professional associations, civil society groups and funding agencies (health systems level).
- b) Micro level, or the workplace itself (district or facility, etc.), such as availability of equipment, drugs and supplies, teamwork and human resources management activities. In principle, these can be influenced by local managers, colleagues, patients, and other local partners (health facility level).
- c) Individual characteristics and living circumstances, such as living in conflict areas or being a woman or a newly graduated professional. These require specific group strategies and can be developed locally by managers or nationally by policy-makers and planners together with other stakeholders (individual level).

Interventions are designed based on an analysis of the determinants that influence health workers' performance. Implementation of these interventions (inputs and process) provides outputs (expected results) in terms of improved working conditions, improved motivation, improved staff retention, etc.

Employees' Capacity

Highly skilled physicians, nurses, administrators, and ancillary staff are critical to producing high-quality outcomes and effective quality improvement hence hospital growth (Argote, 2000). There is need for selective hiring of qualified staff. Successful recruitment and retention of staff is tied to empowerment of staff that must be treated as full partners in the hospital operation and given opportunities for advancement (Brown and Duguid, 2003). The hospitals need to place great emphasis on recruiting and retaining top-level physicians and nurses, accompanied by an effort to encourage these professionals to form working teams, including case managers, pharmacists, social workers, and others, to promote quality (Brown and Duguid, 2003).

To facilitate service quality and growth, hospitals must implement effective human resource strategies involving selective hiring, and retention of physicians and nurses (Cohen and Levinthal, 2001); monitoring of doctors on staff (or with privileges) and ensuring that they must continue to meet certain performance and practice standards to retain credentials (Crewson, 2004). To improve efficiency in service delivery, public sector hospitals must build the capacity to attract and employ an adequate number of high-quality nurses (Argote and Ingram, 2000) suggests that the key to service delivery is to adapt to circumstances that are constantly changing and that the long-term winners are the best adapters, but are not necessarily the winners of today's race for market share. Hospitals quality of service often fails because of the sum total of seemingly inconsequential events arising from employees lack of capacity as in itself service delivery requires specific skill levels and experience which must be continuously learned (Cohen and Levinthal, 2001).

Technology

Technology for harnessing of Information and data play a critical role in the quality service delivery in hospitals (Allen, 2001). Investments in Technology that facilitate service assessment and improvement process is essential (Dutton and Starbuck, 2002). The hospital must show four main commitments: a willingness to invest in Information Technology; investments in Information Technology and in Quality Insurance departments with qualified staff that abstract medical records, analyze data, and facilitate the Quality Insurance process (Cibulskis and Hiawalyer, 2002). According to the Government of Kenya (2001) report, successful Technology strategy that needs to be employed by hospitals and this must involve four main commitments: a willingness to invest in Information Technology, Working with physicians and others to customize an information system to meet specific needs and culture of the institution; nurturing and encouraging buy-in so new systems will be utilized and their benefits will be realized and devising information technology systems that provide real-time feedback to providers as they are caring for patients.

3. Methodology

The study adopted descriptive survey approach in collecting data from the respondents. The descriptive survey method was preferred because it ensures complete description of the situation, making sure that there was minimum bias in the collection of data and finding out the what, where and how of a phenomenon (Kothari, 2008). Data was gathered by use of closed and open ended questionnaires, which were self administered. The information required for the study is obtained directly from the target population. Data from questionnaires was analyzed using the descriptive statistics and chi-square statistical method which offers extensive data handling capabilities and numerous statistical analysis routines that can analyze small to very large data statistics.

4 Analysis of Questionnaire Return

A total of ninety (90) questionnaires were distributed out of which ninety (90) were returned in usable form as shown in table 4.1 below. The result demonstrates that one hundred copies of the completed questionnaire were found useable giving a response rate of approximately 100 per cent.

Table 4.1: Questionnaire Return

Variables	Frequency	Percentage %
Questionnaires returned	90	100.0
Questionnaire not returned	0	0
Total	90	100.0

Source: Field Survey, 2014

4.2 Demographic and Data Analysis

The results in table 4.2 below showed that 69 out of 90 respondents are male and this gives 76.7% of the whole respondents while 21 out of 90 respondents are female and this constitutes 23.3% of the total respondent.

We can then conclude that there were more male than female respondents in the research study.

21 out of 90 respondents were single and it gives 23.3% of the total respondents, 51 out of 90 respondents were married and this gives 56.7% of the whole respondents while 18 out of 90 respondents were divorced/separated and this represent 20.0% of the total respondents.

Therefore we can then conclude from the analysis that there are more married than single respondents in the research study.

The result above revealed that 11 out of 90 respondents were below the age 25 and this represent 12.2% of the whole respondents, 57 out of 90 respondents were between the age 25-35 years and this constitutes 63.3% of the total respondents, 20 out of 90 respondents are between the age 36-45 years and this represent 22.2% of the total respondents while only two respondent were 46 years and above (2.2%).

Therefore, we can then conclude that there are more respondents between the ages 25-35 years in the research study followed by 36 to 45.

The populations were made up of 29 (32.2%) doctors, 17 (18.9%) nurses, 18 (20.0%) clinical officers, 14 (15.6%) laboratory scientists/technicians and 12 (13.3%) pharmacists.

Table 4.2: Characteristics of Respondents

VARIABLES	FREQUENCY	PERCENTAGE (%)
Sex		
Male	69	76.7
Female	21	23.3
Total	90	100.0
Marital Status		
Single	21	23.3
Married	51	56.7
Divorced/Separated	18	20.0
Total	90	100.0
Age Group		
Below 25 years	11	12.2
Between 25-35 years	57	63.3
Between 36-45 years	20	22.2
46 and above	2	2.2
Total	100	100.0
Job Category		
Doctors	29	32.2
Nurses	17	18.9
Clinical officers	18	20.0
Lab. Scientists/technicians	14	15.6
Pharmacist	12	13.3
Total	90	100.0

Source: Field Survey, 2014

4.3 Analysis of Research Questions

(SA- Strongly Agree, A -Agree, SD- Strongly Disagree, D- Disagree)

Table 4.3: Results of the Respondents Views on the Research Questions

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Propositions	Responses	Frequency	Percentage (%)
State house clinic Abuja offers quality medical laboratory services	SA	75	83.3
	A	15	16.7
	SD	-	-
	D	-	-
Employee's incompetence affects service quality in the public health sector	SA	90	100.0
	A	-	-
	SD	-	-
	D	-	-
Staff are usually sent for training programme.	SA	70	77.8
	A	5	5.5
	SD	15	16.7
	D	-	-
There is high level of technology investment State house clinic Abuja	SA	49	54.4
	A	17	18.9
	SD	20	22.2
	D	4	4.4
The communication channel used at State house clinic Abuja is very effective	SA	54	60.0
	A	15	16.7
	SD	-	-
	D	21	23.3
The working conditions in State house clinic Abuja are adequate enough for workers to be able to give their best	SA	55	61.1
	A	20	22.2
	SD	5	5.6
	D	10	11.1
	SA	55	61.1
	A	35	38.9
	SD	-	-

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The type of communication channel used at State house clinic Abuja lead to patient's satisfaction	D	-	-
	SA	90	50.0
	A	-	-
	SD	-	-
Medical tests and nature of treatment were clearly explained in the hospital	D	-	-
	SA	33	36.7
	A	57	63.3
	SD	-	-
There is a high level of financial resource allocation for the clinic	D	-	-
	SA	63	70.0
	A	6	6.7
	SD	21	23.3
There is high quality level of health services provided in the clinic	D	-	-
	SA	90	100.0
	A	-	-
	SD	-	-
Quality medical laboratory services has a positive effect on workers' productivity	D	-	-
	SA	-	-
	A	-	-
	SD	-	-

Source: Field survey, 2014

All (100%) of the respondents indicated that State house clinic Abuja offers quality medical laboratory services; Employee's incompetence affects service quality in the public health sector; Quality medical laboratory services has a positive effect on workers' productivity; The type of communication channel used at State house clinic Abuja lead to patient's satisfaction; There is a high level of financial resource allocation for the clinic. They also agreed that medical tests and nature of treatment were clearly explained in the hospital. This is concurred with Rust and Tuck (2006) who stated that designing services to be user friendly will simultaneously facilitate consumer use and external communication as to what the service delivery system is actually able to provide the customers. Majority (83.3%) of the

respondents indicated that the workers are usually sent for training programmes and workshops while a few (16.7%) of the respondents were of contrary opinion.

On the level of technology in the State house clinic, majority (73.3%) of the respondents indicated that there was high level of technology investment while a few (26.6%) of the respondents indicated that there was low level of technology investment. Majority (76.7%) of the respondents agreed that the communication channel used at State house clinic Abuja was very effective while (23.3%) of the respondents disagreed. This concurred with Payne (2006) who indicated that through communication patients' access to treatment, participation in preventive measures, ability to obtain consent, improve health professionals abilities to meet their ethical obligations, quality of care, including, hospital admissions, diagnostic testing, medical errors, patient follow-up, quality of mental health care and patient safety. 83.3% of the respondents agreed that the working conditions in State house clinic Abuja are adequate enough for workers to be able to give their best while 16.7% of the respondents were of contrary opinion.

4.4 Test of Hypotheses

Chi – square is given as:

$$X^2 = \sum \frac{(o - e)^2}{e}$$

Where

X^2 = Chi – square

o = Observed frequency

e = Expected frequency

Σ = Summation of the frequency.

DECISION RULE: Reject Null Hypothesis if calculated value of (X^2) is greater than the critical value and accept Null Hypothesis if calculated value of (X^2) is less than the critical value.

The Degree of Freedom = (n - 1) (k - 1)

Where Df = Degree of freedom

n = Number of Rows

k = Number of Column.

4.4.1 Hypothesis One

Ho¹: Employees' capacity has no influence on the provision of quality medical laboratory quality services.

Table 4.4: Chi-square Table on the Influence of Employees’ Capacity on the Provision of Quality Medical Laboratory Services

Options	oi	Ei	oi-Ei	(oi-Ei) ²	$\frac{(oi-Ei)^2}{Ei}$
Strongly Agree	41	18	23	529	29.40
Agree	30	18	12	144	8.00
Undecided	5	18	-13	169	9.39
Disagree	9	18	-9	81	4.50
Strongly Disagree	5	18	-13	169	9.39
Total	90	90	0	1092	60.68

Source: Computed from Data, 2014

$$\text{Calculated } (x^2) = \sum \frac{(O - E)^2}{E} = \frac{1092}{18} = 60.6$$

Degree of freedom “d.o.f” = n – 1

Where n = number of rows

Therefore, d.o.f = 5 – 1 = 4.

Tabulated (x^2) = At 0.05% level of significance, the tabulated value of x^2 for 4 degrees of freedom is 9.488

Decision: Since the calculated X^2 (60.6) is greater than the tabulated x^2 (9.488), we reject the null hypotheses (H_0) and accept the alternative hypotheses (H_A).

This indicated employees’ capacity has an influence on the provision of quality medical laboratory services. This concurred with Argote, (2000) who stated that highly skilled physicians, nurses, administrators, and ancillary staff are critical to producing high-quality outcomes and effective quality improvement hence hospital growth.

4.4.2 Hypothesis Two

H_0 : Adoption of technology has no effect on quality medical laboratory service delivery.

Table 4.5: Chi-square Table on the Effect of Adoption of Technology on Quality Medical Laboratory Service Delivery

Options	oi	Ei	oi-Ei	(oi-Ei) ²	$\frac{(oi-Ei)^2}{Ei}$
Strongly Agree	36	18	18	324	18.00
Agree	35	18	17	289	16.06
Undecided	9	18	-9	81	4.50
Disagree	5	18	-13	169	9.39
Strongly Disagree	5	18	-13	169	9.39
Total	90	90	0	1032	57.34

Source: Computed from Data, 2014

a. 0 cells (.0%) have expected frequencies less than 5. The minimum expected cell frequency is 18.

Decision rule: Reject H_0 , where X^2 calculated is greater than x^2 tabulated, otherwise, accept H_A .

$$\text{Calculated } (x^2) = \sum \frac{(O - E)^2}{E} = \frac{1032}{18} = 57.3$$

Degree of freedom "d.o.f" = $n - 1$

Where n = number of rows

Therefore, $d.o.f = 5 - 1 = 4$.

Tabulated (x^2) = At 0.05% level of significance, the tabulated value of x^2 for 4 degrees of freedom is 9.488

Decision: Since the calculated X^2 (57.3) is greater than the tabulated x^2 (9.488), we reject the null hypotheses (H_0) and accept the alternative hypotheses (H_A). This indicated that the adoption of technology in state house clinic Abuja has a significant effect on quality medical laboratory service delivery. The findings concurred with Mills (2001) who found that devising information technology systems provided real-time feedback to providers as they were caring for patients, through technology, the hospital would be in a position of offering bar-coded medications and automatic dispensing; coordinating patient admissions with bed capacity, immediate tracking of filled beds and daily changes in nursing needs. Adoption of technology enable the workers to employ a wide range of complex modern scientific techniques to carry out a varied, highly practical and analytical test on blood, body fluids and other biological materials including tissue samples leading to prompt diseases diagnosis and treatment of patients as well improve the capability and productivity of the workers.

5. Conclusion

From the findings, the study concluded that organization must enhance employee's capacity in order to improve provision of quality service which in turn increases workers productivity. Adequate number of high skilled and experienced employees must be employed continuously, ineffective recruitment must be discouraged, monitoring of doctors and other staff must be encouraged to ensure that performance and practice standards are met to enhance quality service provision. This would lead to proper medication services, patient satisfaction, good relationship between medical providers and patients, enable the participation in multi-disciplinary and attracts more patient hence effective improvement of hospital growth.

From the findings, the study concluded that the health sector should improve the level of adoption of technology and willingness to invest and advance in modern technology in order to facilitate service assessment, improve process and communication which are essential for effective and efficient quality service in public health sector in Nigeria.

Recommendations

The Nigerian government in an attempt to improve its public healthcare system has been in the processes of drafting various health policies. From the findings of this study, it is recommended that:

- i. It is imperative that the government comprehensively addresses all the issues of concern in the public health sector.
- ii. Efforts should be initiated to develop quality indicators in laboratory medicine that can evaluate and subsequently improve the health care system in an effective manner.

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