Efficiency and Productivity Pattern of Public and Private Hospitals in Oyo State Nigeria

Joseph Afolabi Ibikunle

Department of Economics, Ajayi Crowther University, Oyo, Nigeria

Abstract:- **The importance of good health to social and economic development has been the reason for countries' health systems to pursue effective, efficient, quality and equity objectives. However, the success depends on how much any or all of these objectives could be attained. This study estimates the efficiency and productivity pattern of public and private hospitals in Oyo State, Nigeria for the period of 2007 to 2016. Convenience sampling method was employed to select 10 public and 10 private hospitals. The input data are the number of Doctors, Nurses, hospital beds, unit cost of operation, equipment and cost of drugs while the output variables were inpatient, outpatient, deliveries and revenue. Data Envelopment Analysis and the Malmquist Productivity Index (MPI) was used to calculate the efficiency and productivity growth of the hospitals. Findings revealed that the public hospitals were more efficient in terms of technical, allocative and cost with the mean score of (0.858, 0.822 and 0.701) than the private hospital (0.616, 690 and 0.425), but both are deteriorating in productivity growth (0.971 and 0.763). The study recommended that the Ministries of Health should equip the hospitals towards the changing health demands and competitiveness in the cost of operation for both hospitals.**

Keywords: **Hospital, Data Envelopment Analysis, Malmquist Productivity Index, Productivity Growth, Health System, Efficiency**

JEL Classification: **I111, D24**

I. INTRODUCTION

The choice of health care facilities by individuals is determined in part by their taste, satisfaction with services, and the perceived quality of care provided [1]. This is because, health is seen as the wealth of a nation and it significantly enhances the economic development of the nation [2, 3, 4]. Towards providing good health, the government makes it top priority in its Millennium Development Goals (MDGs). However, with the near failure of the MDG to meet its targets and the new policy of sustainable development at the end of 2015, there is a growing sense of urgency among international agencies to intensify efforts on addressing the global challenge of effective and efficient health care delivery system. Consequently, the importance of human health in national development has made efficiency in the production of health services a subject of intense research interests in the literature. This, of course, seems worthwhile if Hollingsworth's and Umezinwa's opinions that 'spending on health is normally regarded as a productive investment' is considered [5, 6].

Health care is provided through public and private providers, depending on the country's health system's boundary [7]. Public hospitals provide healthcare as social services and sometimes as a public good, they can either be state owned or fully run by public entities, while the private ownership can be mission driven not for profit or return driving (for profit). However, observations have shown that over the years, in most developing countries where resource constraints are enormous, it is not unusual to find long queues of patients in public and private hospitals waiting patiently for several hours for medical attention. It is also noted that some hospital managers are regularly under pressure to find more beds, to hire more medical personnel, to provide more drugs and other resources towards attaining effective and efficient health care services. Inefficiency in the use of the available health resources may imply that the sick child next in line may die without receiving medical attention. Doctors and nurses often watch helplessly as patients die because basic health care materials are notavailable in right proportions. It is either too many beds and insufficient drugs, or too many administrative staff and too few qualified Doctors and Nurses and so on. Many countries with low income are below international health goals not only because of scarcity of resources but, more painfully, because resources are not put to maximum use[8].

Today, theimportance of good health to social and economic development has been the reason for countries' health systems to pursue effective, efficient, quality and equity objectives. However, the success of the health system depends on how much any or all of these objectives could be attained. The Nigerian health system display low achievement of these objectives as can be found in her health outcomes.53years average life expectancy, under-five mortality rate of 201/1000 life birth and 846/100,000 maternal death as against 71years average life expectancy, 71.4/1000 life birth and 830/100,000 maternal death in sub-Saharan Africa and SDGs target respectively.Above situations led Nigeria to be ranked 187 of 191 in her health system by the World Health Organisation's ranking (Bello, Morakinyo & Fagbamigbe and WHO[9 -11]).

Over the year's disputes between the proponents of private and public provision of healthcare have escalated. This is because patients tend to access healthcare from both private and public hospitals [12]. Both sides claim their critics are ideological biased and selectively draw on case reports to defend their viewpoints. Advocate of the private sector opined

that the private sector may be more efficient and responsive to patient needs because of market competition, which they indicate should overcome government inefficiency and corruption. In contrast, critics of the private health sector highlighted inequalities in access to healthcare resulting from inability of the poor to pay for private services, failure to deliver public health goods including preventative services, lack of coordinated planning, poor equipment and so on has made the proponents of the public sector have confidence that public healthcare provision is of most benefit to poor people and is the only way to achieve universal and equitable access to health care come 2030.

However, despite the highly vociferous nature of the debate, and the extreme importance of providing healthcare services in both the developed and developing countries, extant studies have shown that there is still no consensus as to the best sector to rely upon.For some of the studies, the relative efficiency of private and public-sector provision of health care is neither here nor there (See for example Oliver, Jonans and Reinhard and Pia, Karen, Alabi and Imoh[13, 14] while some studies are of the view that the private sectors are more efficient than the public sectors (see for example (Hollingsworth, Andrew, Ogoh[5,15, 17]). In contrast, Jacob and Lee, Yang and Mchoi[18 -19] found that Public provision were more efficient than the Private sector provision of health care facilities.

In view of the above, it is apparent that the size of expenditure on health care services may not be a guarantee for better health outcomes, but rather, depends on the effectiveness and efficiency of the health sector. Therefore, this study estimates the efficiency and productivity pattern of public and private hospitals in Oyo State. The objectives of the study were to i)evaluate the technical efficiency of the public and private hospitals; ii) access the allocative and cost efficiency of the public and private hospitals; iii) determine the pattern of productivity growth for both technical efficiency change and technological change in driving total factor productivity change among the health care providers in Oyo State

Apart from the introduction, the paper develops as follows. Section 2 presents the review of literature. Section 3 focuses on the methodology. The analysis of result is presented in section 4 while section 5 concludes and recommends.

II. LITERATURE REVIEW

Health system is defined as all activities whose primary purpose is to promote, restore, and maintain health[20]. In Nigeria, the federal structure has shaped health delivery as all the three tiers of government are involved in health care delivery, organisation, management and financing. The tertiary health care is provided by the federal government, secondary health care by the State governments while Local Government Areas (LGAs) shoulder responsibility at the primary level.

Efficiency can simply be defined as the ratio of output to input. According to Farell [21], efficiency of any decision-making units (DMU) means the success of the unit to produce the largest possible outputs from inputs available. The overall efficiency of a DMU can be defined as the product of two distinctive measures of efficiency namely; technical and price efficiency. A DMU is considered to be technically efficient when it uses fewer inputs to achieve a given level of output or more output with a given amount of inputs. The price efficiency on the other hand measures the extent to which a DMU uses the various factors of production in the best proportions, in view of their prices. The resulting inefficiency arising after controlling for input prices are known as allocative inefficiency [22, 23].

Empirically, several literatures on the efficiency have been carried out ranges from the developed, emerging economies and Nigeria. Kitaki[24] examined the technical efficiency of public and private hospitals in Vietman using micro hospital data from six regions. The Data Envelopment Analysis was employed. Findings from the study shows that private hospitals have significantly lower efficiency than the public hospitals. Although both public and private hospitals have significant negative correlation with their efficiency.

Kruse, Adang, and Groenewood examined whether private hospitals outperform the public hospitals regarding efficiency, accessibility, and quality of care in the European Union. They concluded that private (for profit) hospital sector seems to react more strongly to (financial) incentives than other provider types. In terms of quality of care no conclusive results was found. However, they concluded that the growth in private hosals provision seems not related to improvement in performance in Europe [25].

Bwana and Raphael examine the technical efficiency of private teaching hospitals in Tanzania using Data Envelopment Analysis method in a sample of 18 teaching hospitals between 2009 and 2013. The study reveals that out of 18 teaching hospitals, only 4 (22.3%) is operating close to technical efficiency with average level of technical efficiency ranging between 92% and 98%. The remaining 14 hospitals are operating far from efficiency frontier. Overall mean scale efficiency was found to be 82.4%. With support of DEA, this study has revealed inefficiency in the use of scarce health care resources in teaching hospitals in Tanzania. The study however, ignores the private hospital but concentrated solely on the teaching hospital which may not be a good method to determine the hospital efficiency in the country [26].

Hassan, Norashidah, Zaleha and Peteremployed stochastic frontier analysis to determine the level of efficiency of health-care expenditure using three health outputs among low- and middle-income countries in Africa, from 2002–2011. The technical efficiency result showed that; among the health outcomes estimated, life expectancy at birth recorded higher efficiency among both low and middle-income African countries, while Anti-retrieval was the least efficient outputs. The study also calculates the expenditure savings when

maximum efficiency is attained, where the average was 0.21 % and 0.29% of GDP for low and middle-income countries respectively. The study recommends that governments should improve not only health care expenditure but also factors affecting health other than health care to reduce the burden on health-care facilities and reduce the burden of disease in the region. However, the study concentrates on only one methodology which may be biased [27].

In Nigeria, Ichoku, Fonta, Onwujekwe and Krigia used the translog production function version of the stochastic frontier (SFA) model to estimate the efficiency levels of individual hospitals and the determinants of inefficiency in Nigeria. The results indicated large variations in the efficiency scores of sampled healthcare facilities with average efficiency of 71%. Private hospitals showed greater level of efficiency than public ones. The average scale elasticity was also found to reflect constant returns to scale. The results suggest that large social welfare gains could be made by improving the efficiency of hospitals in low income countries [28].

Umeano- Enemuoh, Onwujekwe, Uzochukwu and Ezeoke examined Patients' Satisfaction and Quality of Care in Tertiary Institution in South-east Nigeria using the test of mean score. A cross sectional study for 360 systematically selected participants completed 5-point likert scale self-administered questionnaire to rate their satisfaction level and quality of services provided, as well as factors of importance where best service is provided. Overall, participants are quite satisfied (Mean score = 3.75) with the services provided by the different service providers. Respondents also indicated that overall the quality of care of the health facility is good (mean score = 3.45). Pharmacy received the highest satisfaction level with a mean rating of 4.1. Over a third participant (38%) rated the services provided by the doctors as best despite giving the highest quality ratings with a mean of 3.9 to pharmacy compared to mean ratings of 3.4 for the doctors. Respondent's greatest displeasure is with the time spent at the facility as 63.9% of them are displeased. More than a third (36.9%) is most pleased with information given to them as a factor of importance. Participants are quite satisfied with the services provided as well as the quality of care by the different service providers of the health facility. There is a need for interventions in terms of time spent at the facility which would promote good customer focused service delivery [29].

Ichoku, Williams, Obinna,examined the technical and scale efficiencies in hospitals in low income countries using Nigeria as a case study. The study uses primary data sample of 200 hospitals to estimate technical and scale efficiencies using the Data Envelopment Analysis (DEA). The results clearly indicate large variation in the efficiency of hospitals with average efficiency score of about 59% under the constant returns to scale assumption and about 72% under variable returns to scale. This raises some concerns about the level of technical and scale efficiencies in utilization of scarce health resources in the hospital sector particularly in low income countries. Although the result is interesting, evidence shows that the SFA approach is not tested [30].

Polsa, Wei, Sääksjärvi, Bei compared the perceived quality of private and public health services in Nigeria focusing on Lagos. The results show distinctly positive perceptions of the service quality provided by both healthcare systems. However, when high-level hospitals are excluded, the scores for the private hospitals are higher. These findings are in line with earlier studies on hospitals in developed countries, but differ from previous findings on healthcare in developing countries [31].

III. METHODOLOGY

The study estimated three different models to achieve the objectives. The first being the DEA model without the inclusion of the input prices, the second was based on the DEA model with the inclusion of the input prices to capture the allocative and cost efficiency while the third model was based on the Malmquist productivity index (MPI) to measure the pattern of productivity growth of the hospitals.

3.1 Model I

The dual version of the Charnes, Cooper and Rhodes [32] input orientated DEA model with constant return to scale was used to achieve the first objective of the paper. The model is specified as follows:

$$\min_{\theta,\lambda} \theta$$

Subject to:

$$-y_{it} + Y\lambda \geq 0$$
$$\theta x_{it} - X\lambda \geq 0$$
$$\lambda \geq 0 \qquad (1)$$

Where x_{it} denotes the column vector of individual hospital *i* inputs (Number of Doctors, Number of Nurses and Number of Hospital Beds) in period *t* and y_{it} represents column of outputs of individual hospital *i* (Inpatient, Outpatient and Deliveries) in period *t*. *X* and *Y* represents the matrix of inputs and outputs respectively for all the hospitals. θ is the efficiency scalar that lies between 0 and 1. When a hospital has $\theta = 1$, then the hospital is at a point on production frontier. It is technically efficient relative to other hospitals in the comparative group. But for $\theta < 1$ implies that the hospital is relatively inefficient. It is below the production frontier. The amount by which the score of the inefficient hospital differs from 1 indicates the extent the hospital could reduce inputs without reducing its output. λ is a column vector of constants which represents the weight.

3.2 Model II

In order to achieve the second objective of the paper, the DEA model by Coeli, Prasada, Rao and George [33] was employed. Here, the input prices were used and the model is specified as

$$Min_{\lambda, x_{it}^*} w_{it}^{'} x_{it}^*$$

Subject to:

$$-y_{it} + Y\lambda \geq 0$$

$$x_{it}^* - X\lambda \geq 0$$

$$N1^{'}\lambda_i = 1$$

$$\lambda_i \geq 0 \qquad (2)$$

Where:

w_{it} is a vector of unit price of inputs (unit cost of equipment, unit cost of drugs and unit cost of operating expenses) utilized by hospital i in time t.x_{it}* (which is calculated by the Linear Programming) is the cost minimization vector of input quantities for the i-th hospital in period t, given the input price w_i and the output level y_{it}. y_{it} is the amount of output (revenue) generated by hospital i in period t.N1 is an NX1 vector of 1 and λ_i is a dual variable. The total cost efficiency (CE) or economic efficiency (EE) of the i-th hospital in period t is measured by the ratio of minimum cost to observed cost is calculated thus

$$CE = w_{it}^{'} x_{it}^* \Big/ w_{it}^{'} x_{it} \qquad (3)$$

A hospital is said to have realized allocative efficiency if it is operating with the optimal combination of inputs, given their respective prices. When a hospital has θ = 1, then the hospital is at a point on production frontier. It is relatively overall efficient to other hospitals and as such properly using their inputs resources to produce output and choosing the correct mix of inputs given the input prices in the comparative DMU. But for θ <1 implies that the hospital is relatively inefficient and as such not properly using their inputs resources to produce output and choosing the correct mix of inputs given the input prices. The amount by which the score of the inefficient hospital differs from 1 indicates the extent the hospital could reduce inputs without reducing its output. The allocative efficiency is calculated residually by using the following relationship between cost efficiency (CE) and technical efficiency (TE) as:

$$AE = \text{CE/TE} \qquad (4)$$

When a hospital has θ = 1, then the hospital is at a point on production frontier. It is allocatively efficient to other hospitals and as such properly choosing the correct mix of inputs given the input prices in the comparative group. But for θ <1 implies that the hospital is allocatively inefficient.

3.3 Model III

To determine the productivity growth pattern arising from the technical efficiency change and technological change, the Malmquist productivity index was employed in order to determine the growth pattern of the hospitals. In line with Fare, Grosskopf, Lindgren and Bjorn [34], the Malmquist index which measures the total efficiency change of production unit between successive periods t and t+1 is specified as:

$$M_{ic}\left(x_{t+1}, y_{t+1}, x_t, y_t\right) = \left[\frac{D_i^t\left(x_{t+1}, y_{t+1}\right)}{D_i^{t+1}\left(x_{t+1}, y_{t+1}\right)} \times \frac{D_i^t\left(x_{t+1}, y_{t+1}\right)}{D_i^{t+1}\left(x_t, y_t\right)}\right]^{1/2} \qquad (5)$$

Where the notation D represents the distance function and the value of M is the Malmquist productivity index. The first index relates the input - output combinations observed in the two time periods (*t* and *t + 1*) to the period *t* technology frontier, and the second index relates the same input - output combinations to the period *(t + 1)* technology frontier. The terms in the numerator are the inputs used and outputs generated by firms *i*in period *t + 1*, and those in the denominator represent the corresponding quantities observed for period *t*.

Following Fare, Grosskopf, Lindgren and Jean-Pierre [35], manipulation of the Malmquist index makes it possible to distinguish between efficiency changes and productivity changes and is specified as

$$m_{ic}\left(x_t, y_t, x_{t+1}, y_{t+1}\right) = \frac{D_i^{t+1}\left(x_{t+1}, y_{t+1}\right)}{D_i^t\left(x_t, y_t\right)} \left[\frac{D_i^t\left(x_{t+1}, y_{t+1}\right)}{D_i^{t+1}\left(x_{t+1}, y_{t+1}\right)} \times \frac{D_i^t\left(x_{t+1}, y_{t+1}\right)}{D_i^{t+1}\left(x_t, y_t\right)}\right]^{1/2} \qquad (6)$$

Where: $\dfrac{D_i^{t+1}\left(x_{t+1}, y_{t+1}\right)}{D_i^t\left(x_t, y_t\right)}$ is the technical efficiency change which refers to the change in the relative efficiency of a hospital in relation to other hospitals (i.e. due to the production possibility frontier) between time periods t and t+1. $\left[\dfrac{D_i^t\left(x_{t+1}, y_{t+1}\right)}{D_i^{t+1}\left(x_{t+1}, y_{t+1}\right)} \times \dfrac{D_i^t\left(x_{t+1}, y_{t+1}\right)}{D_i^{t+1}\left(x_t, y_t\right)}\right]$ is the technical change or the change in technology efficiency which describes the change in the production possibility frontier as a result of the technology development between time periods t and t+1.

$M_{ic}\left(y_t, x_t, y_{t+1}, x_{t+1}\right)$ can attain a value greater than, equal to, or less than one depending on whether a hospital in question is experiencing productivity growth, stagnation, or productivity decline. A value greater than one signaled progression in productivity growth, value less than one

signaled deterioration while a value of one indicate that the hospital is stagnant.

3.4 Input and Output Data

This study made use of the number of Doctors, number of Nurses, number of hospital beds, unit operating cost of hospitals, unit cost of equipment and unit cost of drugs as indicator of accumulated capital; these variables were used as input variables. The output variables were the inpatient, outpatient, deliveries and revenue generated by each hospital sampled. The data for the research were obtained for the period 2007 to 2016. Information required for the analysis were extracted from all the hospitals both private and public through the use of a well-structured questionnaire. The questionnaire was open ended type so as to ensure that information received is meaningful for generalization.

IV. RESULTS AND DISCUSSION

Table 1 presents the technical efficiency score result computed with the Data Envelopment Analysis Program (DEAP). The input variables are the number of Doctors, Nurses and Hospital Beds while the output variables were the inpatient, outpatient and deliveries.

Table 1: Technical Efficiency of Public and Private Hospitals in Oyo State

Years	Public Hospitals	Private Hospitals
2007	0.872	0.843
2008	0.892	0.826
2009	0.871	0.875
2010	0.88	0.727
2011	0.793	0.854
2012	0.881	0.547
2013	0.769	0.352
2014	0.779	0.896
2015	0.879	0.507
2016	0.968	0.629
Mean	0.854	0.706

Source: Author's computation, 2018

Table 1 shows the result of the technical efficiency when the input prices were not used. From the table public and private hospitals displayed inconsistency as can be seen in table 1 and depicted in Fig. 1. For some periods, 2007, 2008, 2010, 2012, 2013, 2015 and 2016, the public hospitals perform better by moving closer to the technical efficiency score of 1.000 than the private hospitals While for the following years, 2009, 2011 and 2014 respectively, the private hospitals perform better than public hospitals based on their efficiency score of those years been higher than that of the public. Although, for the whole periods, none of the hospitals where fully technically efficient as their technical efficiency score level lies below 1.000. In general, the summary of the annual mean score for public hospitals is higher than that of the private, with the public hospitals having a score of 0.858 which is higher than the private hospitals score of 0.706. The reported technical efficiency scores of the hospitals generally indicate that the hospitals are not utilizing their production resources efficiently, meaning they are not annexing maximal output (inpatient, outpatient and deliveries) from their quantum of inputs (Doctors, Nurses and Hospital Beds). The above result is depicted on the chart below

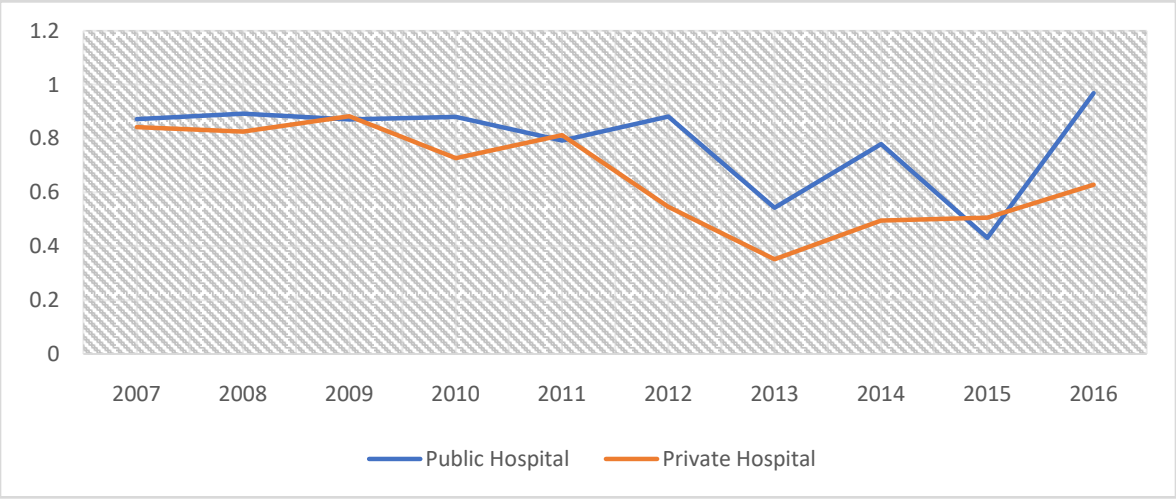

Figure 1 Trend of Technical Efficiency Scores for public and private hospitals (2007 -2016)

From the chart in figure 1, it shows that private hospitals line was closer to the efficiency score of 1.000 than the public hospitals for the year 2009, 2011 and 2015 respectively. This periods however indicate that the private hospitals perform better than their public counterpart.

Table 2: Technical Efficiency (TE), Allocative Efficiency (AE) and Cost Efficiency (CE) of Public and Private Hospitals

Years	Public TE	Private TE	Public AE	Private AE	Public CE	Private CE
2007	0.872	0.843	0.839	0.603	0.729	0.517
2008	0.892	0.826	0.802	0.767	0.711	0.606
2009	0.571	0.675	0.704	0.94	0.599	0.63
2010	0.88	0.727	0.89	0.734	0.778	0.522
2011	0.793	0.554	0.967	0.502	0.768	0.262
2012	0.881	0.892	0.858	0.58	0.747	0.334
2013	0.769	0.352	0.807	0.637	0.625	0.251
2014	0.779	0.896	0.813	0.656	0.623	0.283
2015	0.879	0.507	0.681	0.712	0.601	0.354
2016	0.968	0.629	0.86	0.768	0.832	0.489
Mean	0.858	0.616	0.822	0.690	0.701	0.425

Source: Author's computation, 2018

The summary of the mean for the technical, allocative and cost efficiency indicate that the public hospital has relative efficiency than the private hospitals due to technical, allocative and cost efficiency with value of 0.858, 0.822 and 0.701 while private hospitals were 0.616, 0.690 and 0.425 respectively. However, for the different years, the table shows that in terms of allocative and cost efficiency, both public and private hospitals also displayed inconsistency. For some periods, the public hospitals were efficient than the private hospitals while the private were more efficient than the public in some instances. The mean results is shown on the graph below

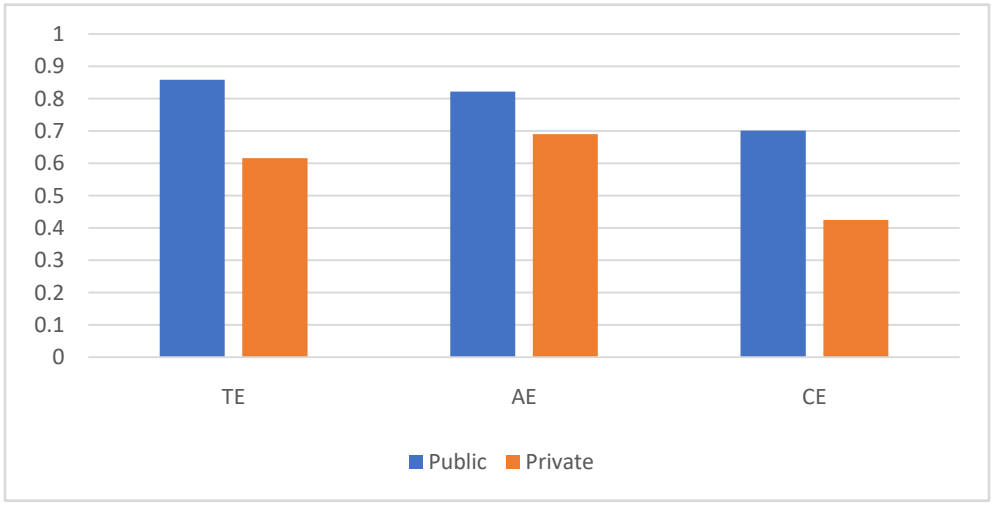

Figure 2: Technical Efficiency (TE), Allocative Efficiency (AE) and Cost Efficiency (CE) of public and private hospitals in Oyo State.

Figure 2 shows the bar chart of public and private hospitals in Oyo State. The chart shows that for the three efficiency measurements, the public hospitals are higher than the private hospitals. The reported allocative efficiency scores of the hospitals generally indicate that the hospitals are not utilizing the perfect mix of their inputs given the input prices to commensurate with their output, meaning they are not annexing maximal output from their quantum of inputs given the input prices. In order words, allocative efficiency of the hospitals can be increased by better use of available production resources (equipment, drugs and operating expenses) given the current state of technology. However, based on the results, the public hospitals are allocatively efficient than the private hospitals if monetary inputs are used in generating monetary outputs. Although, for the whole periods, both the public and private hospitals where not cost efficient as their efficiency score level lies below 1.000 but the public hospitals are a bit preferable in terms of cost

Table 3: Technical Efficiency Change, Technological Change and Total Factor Productivity Change of Public Hospitals in Oyo State

Year	ΔEFF	ΔTECH	ΔTFP	Dec ΔEFF	Dec. ΔEFF	Dec. ΔTFP
2007/2008	1.262	0.681	0.86	Progressing	Deteriorating	Deteriorating
2008/2009	0.691	1.877	1.296	Deteriorating	Progressing	Progressing
2009/2010	1.322	0.653	0.863	Progressing	Deteriorating	Deteriorating
2010/2011	1.02	0.885	0.903	Progressing	Deteriorating	Deteriorating
2011/2012	1.028	0.938	0.964	Progressing	Deteriorating	Deteriorating
2012/2013	0.963	0.961	0.925	Deteriorating	Deteriorating	Deteriorating
2013/2014	1.243	0.798	0.992	Progressing	Deteriorating	Deteriorating
2014/2015	0.599	1.413	0.846	Deteriorating	Progressing	Deteriorating
2015/2016	0.97	1.213	1.177	Deteriorating	Progressing	Progressing
Mean	0.981	0.99	0.971	Deteriorating	Deteriorating	Deteriorating

Source: Author's computation, 2018

Table 3 above shows that productivity growth displayed inconsistency for the period under study. For some years in the public hospitals, the hospitals were progressing (2008/2009 and 2015/2016). However, for the rest periods, the hospitals were deteriorating based on the pattern of the technical efficiency change and technological change in the hospitals which is driving the total factor productivity of the hospitals for the years.

Table 4: Technical Efficiency Change, Technological Change and Total Factor Productivity Change of Private Hospitals in Oyo State

Year	ΔEFF	ΔTECH	ΔTFP	Dec ΔEFF	Dec. ΔTECH	Dec. ΔTFP
2008/2009	0.603	1.241	0.748	Deteriorating	Progressing	Deteriorating
2009/2010	0.998	0.831	0.829	Deteriorating	Deteriorating	Deteriorating
2010/2011	0.978	1.212	1.185	Deteriorating	Progressing	Progressing
2011/2012	0.89	0.973	0.866	Deteriorating	Deteriorating	Deteriorating
2012/2013	1.233	0.684	0.843	Progressing	Deteriorating	Deteriorating
2013/2014	1.301	0.82	1.067	Progressing	Deteriorating	Progressing
2014/2015	0.853	1.342	1.144	Deteriorating	Progressing	Progressing
2015/2016	0.756	0.824	0.623	Deteriorating	Deteriorating	Deteriorating
Mean	**0.861**	**0.887**	**0.763**	**Deteriorating**	**Deteriorating**	**Deteriorating**

Source: Authors computation, 2018

For the private hospitals also, the productivity growth displayed inconsistency with technical efficiency change progressing in 2012/2013 (1.233) and 2013/2014 (1.301) periods and deteriorating in the other periods. For ΔTECH it progressed in 2008/2009, 2010/2011 and 2014/2015 (1.241, 1.212, and 1.342) and deteriorated in the other years. Total factor productivity (ΔTFP) (the product of technical efficiency change and technological change) behaved prototype with technical efficiency change and technological change for both public and private hospitals, but are generally deteriorating with productivity scores of 0.763.

V. CONCLUSION AND RECOMMENDATION

This study evaluates the efficiency of public and private hospitals in Oyo state for the period of 2007 to 2016. The overarching message in most studies might actually be the fact that reimbursement schemes are of importance. In Oyo State, private hospitals were found to be less efficient because they use resources less efficiently. This might be due to the fact that private hospitals are confronted with specific regulations that set a limit to the number of patients to be on admissions; since such limits fluctuate over time and are quiet volatiles, this makes the private hospitals face problems to adjust fixed inputs resources accordingly. Nonetheless, public hospitals were found to be cost efficient than private hospitals, meaning that public hospitals have certain output prices and input

prices, and that the hospitals choose the best combination of both input and output factors given the input prices. However, both hospitals where not progressing. The study therefore recommended that Hospital Management Board and the Ministry of Health should create avenue in developing their human resources so as to improve the skills and knowledge of hospital personnel in order to cope with the changing demands of the age and technology.Government should also reduce the health budget gap so as to bring both the public and private hospitals into healthy competition with their foreign counterpart in order to reduce medical tourism and invariably reduce capital flight from Nigeria.

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