

Sectoral Impacts of Rising Electricity Tariffs: The Nigerian Healthcare Delivery Perspective

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ABSTRACT

The physical wellbeing of any nation is a direct function of how effective, available and affordable, its healthcare sector is. Cost effective and functional electricity supply are critical for sustainable healthcare operations, because virtually all medical services depend on reliable power supply for diagnostics, treatment, storage of drugs and life-saving equipment. In Nigeria, this very essential sector is bedeviled by so many problems that limit its functionality. This study investigates the physio-socio-economic impact of electricity tariff increases on the healthcare sector in Nigeria, focusing on how rising electricity costs influence operational efficiency and service delivery. The research integrates descriptive and inferential analyses to provide a comprehensive understanding of the sector's response to electricity tariff adjustments. Descriptive results indicate that while most healthcare organizations have adopted prepaid billing systems and rely on energy-efficient medical equipment, electricity availability and affordability remain major challenges. Rising electricity tariffs were reported to adversely affect productivity and contribute to increased medical costs, suggesting that higher operational expenses are often passed on to patients. Inferential analysis reinforces these findings, indicating a significant positive relationship between electricity tariff increases and healthcare operating costs. Regression analysis further shows that 24.8% of the variation in operating costs can be attributed to changes in electricity tariffs, highlighting their substantial influence on the sector's cost structure. The study concludes that electricity tariff increases significantly elevate operational costs, impacting negatively on both productivity and service affordability. These findings underscore the need for electricity pricing policies that consider the unique energy demands of the healthcare sector to ensure sustainable service delivery and mitigate broader physio-socio-economic consequences

KEYWORDS: Healthcare sector, medical services, Electricity tariffs, operating costs, operational efficiency, service delivery, service affordability, physio-socio-economic impacts.

Date of Submission: 07-04-2026

Date of acceptance: 20-04-2026

I. INTRODUCTION

No society can afford to neglect the physio-socio-economic relevance of its healthcare sector because it is the pillar that sustains the existence of every nation. The physical wellbeing of any nation is a direct function of how effective, available and affordable, its healthcare sector is. In Nigeria, this very essential sector is bedeviled by so many problems that limit its functionality. Electricity plays a critical role in the effective functioning of the healthcare sector, as virtually all medical services depend on reliable power supply for diagnostics, treatment, storage of drugs and life-saving equipment. In a developing economies such as Nigeria, the cost and reliability of electricity remain major challenges, with significant implications for the operational efficiency and financial sustainability of healthcare institutions. In recent years, frequent tariff adjustments by electricity distribution companies (DISCOs) have intensified concerns about the economic burdens placed on service providers, particularly within the healthcare sector, where energy demand is both continuous and critical [1]. In the South-South region of Nigeria, healthcare facilities are largely dependent on public electricity supply

provided by distribution companies such as the Port Harcourt Electricity Distribution Company (PHEDC) and the Benin Electricity Distribution Company (BEDC). However, rising electricity tariffs, billing practices and perceived inefficiencies in power supply have generated mixed reactions among consumers, including healthcare providers. Studies have shown that high energy costs significantly increase operating expenses for hospitals and clinics, often resulting in reduced service efficiency and increased medical costs passed on to patients [2]. Recent increases in electricity tariffs have forced hospitals to adjust their operations, with some facilities passing costs onto patients through higher consultation fees and service charges, thereby worsening healthcare inequities [3, 4] and encouraging preference for self-medication among the vulnerable population. Against this backdrop, this study examines the physio-socio-economic impacts of rising electricity tariffs on the healthcare sector in South-South Nigeria. It specifically evaluates consumers' attitudes and responses toward electricity billing payments, as well as assesses the economic effects of electricity tariff plans and charges implemented by PHEDC and BEDC on healthcare operations. By integrating both consumer perception and economic impact analysis, the study provides empirical evidence on how electricity tariff structures affect healthcare service delivery in the region. The findings are expected to inform policymakers, energy regulators and stakeholders in the healthcare sector, on the need for balanced electricity pricing policies that support sustainable healthcare delivery, while ensuring cost recovery within the power sector [5].

Tariff Adjustments and Energy as a Burden to Physio-Socio-Economic Development

Traditionally, electricity consumers were charged based on their customer category (residential, commercial, industrial, etc.), regardless of the actual hours of supply they received. However, the introduction of Service Reflective Tariff (SRT) significantly influenced the tariff structure of the electricity Distribution Companies (DISCOs) in Nigeria by linking electricity pricing to the quality of service provided. The scheme changed the pricing structure, introducing a performance-based billing system that tied tariffs to actual electricity supply. The reform was aimed at ensuring fairness in billing, encouraging better service delivery and supporting the financial viability of electricity DISCOs.

Under SRT, customers were grouped into Bands A to E, based on the average daily electricity supply to them. Band A – above 20 hours of supply per day at the rate of ₦209.50/kWh; Band B – 16 to 20 hours per day, are charged ₦68.56/kWh; Band C – 12 to 16 hours per day, pay between ₦54.98 and ₦56.91/kWh while Bands D and E consumers, who experience 8 to 12 hours and 4 to 8 hours of power supply respectively per day, are charged at the lowest rates, ranging from ₦41.20 to ₦46.64/kWh. This meant that consumers in urban and industrial zones (Bands A and B) faced higher tariffs due to their more stable power supply, while those in rural areas and underserved communities (Bands D and E) paid lower rates due to limited electricity access. The justification for this disparitive increase is that Band A customers receive over 20 hours of electricity daily, making them the primary beneficiaries of improved power supply and infrastructure investments [6, 7, 8, 9, 10, 11]. The unique energy demands of the healthcare sector places most healthcare institutions on Band A.

Whereas energy serves as an asset for economic and human endeavors, upward tariff adjustments may also engender adverse physio-socio-economic effects, including exorbitant medical expenses (bills). Excessively elevated energy costs relative to net revenues diminish consumers' buying power and adversely affecting institutional competitiveness as well as family welfare. For the most vulnerable segments of the population, elevated energy costs consume a significant percentage of family budgets, thereby diminishing access to essential services, such as, medical, lighting, food, and so on, [12, 13, 14, 15].

II. RELATED WORKS

Increases in electricity tariffs as well as rising diesel prices have negatively impacted the ease of doing business across different sectors in the Nigerian economy. Frequent adjustments of electricity tariffs with the attendant uncertainties and economic instability, have over the years, generated several debates across Nigeria. High electricity tariffs have been linked to increase in production and service-delivery costs, leading to higher prices as well as less availability and affordability of essential goods and services. Despite numerous reforms in the Nigerian energy industry, these sectors are still heavily plagued with the challenge of unreliable power supply and high energy tariffs, which have significantly altered their performance, global competitiveness and long-term sustainability. One of the biggest sectors being impacted is the healthcare sector, which is currently experiencing a shift in how hospitals operate in the country [3, 16, 17, 18, 19, 20, 21, 22, 23].

The implications of the April 2024 tariff increase from ₦68/kWh to ₦225/kWh for Band A customers and the attendant impact on the power sector's liquidity and the broader economy have been analyzed. The

electricity consumption pattern with specific consumption levels that significantly impact the gross domestic product (GDP) and how it influences Nigeria's economic growth, has also been studied and analyzed. Researchers have investigated the impact of energy tariffs and self-generated power supply on business performances in Nigeria and discovered that both, significantly affect business performances across all sectors [10, 24, 25, 26, 27, 28, 29, 30].

In all these studies and analysis on the sectoral impacts of electricity tariff adjustment on the Nigerian economy, the healthcare sector, which bears the burden of the physical wellbeing of the citizenry, seem to have been neglected. This gap has necessitated the need for this study to evaluate the impact of electricity tariff variations on the healthcare sector in South-South Nigeria. The study seeks to provide valuable insights that can inform policy decisions and contribute to the development of a more stable and sustainable electricity sector in Nigeria.

III. METHODOLOGY

The paper investigated the influence of electricity tariff on the healthcare sector in South-South, Nigeria. The study employed the survey method, specifically a descriptive survey, which involved the use of questionnaires for data collection. The survey was distributed randomly among private health establishments in the South-South Nigeria. The paper adopted stakeholders' theory tools to aggregate the perspectives of stakeholders at private health establishments that use grid-supplied electricity for their activities. Stakeholder theory serves as a theoretical foundation which enables the researchers to identify individuals or groups who may influence or be influenced by a proposed action. The questionnaire was distributed to private health establishments in Rivers and Edo States, Nigeria. The healthcare establishments were contacted by mail, with telephone interviews potentially undertaken as follow-up and supplement to the mailing technique.

The questions captured in the questionnaire were grouped into five (5) parts. Following the completion of the collecting process, the questionnaire was revised to guarantee that sufficient replies have been rendered and that the responses are consistent with one another. As a result of this, the major data for this study was collected via the use of questionnaires that were given by the researchers in both hard copies and soft copies through the administration of Google forms. In addition, the questionnaire included open-ended questions, which gave respondents the opportunity to contribute explanations on the topic matter. Responses from a total of 65 private health establishments in the region were used for the study analysis.

The analyses of Tables 1 to 3 provide an integrated understanding of the effects of increased electricity tariffs on the healthcare sector in Nigeria by combining descriptive and inferential evidence. Table 1 presents the descriptive results from the inquiries made regarding the assessment of the impact of increased electricity traffic on the healthcare sector. The Table shows the frequency of responses, along with their corresponding percentages and mean scores, which serve to quantify the central tendency, as well as the standard deviation, which assesses the variability of the responses. The items within the structured questionnaires were presented using a 4-point Likert scale. The inferential analysis of Table 2, reinforces the observations in Table 1. The regression result in Table 3 illustrates and explains the strength of this relationship.

IV. RESULTS AND DISCUSSION

The first item in the Table evaluated whether the participants utilize the prepaid billing system. The findings indicated that over 69% of the participants utilize prepaid meters, whereas around 30.8% have not adopted the system. This was further substantiated by the mean score of 2.831, suggesting that the majority of participants are in favor of utilizing prepaid meters. The descriptive results of Table 1, thus indicate that most healthcare organizations have adopted prepaid billing systems, suggesting efforts to improve cost monitoring and billing efficiency within the sector.

The second item was used to determine whether healthcare organizations utilize machines that consume significant amounts of energy. The findings indicated that a significant proportion of the participants (approximately 76.9%), confirmed the use of high-energy consuming machinery in their operations, while 23,1% of the respondents expressed disagreement. This was further supported by the mean score value of 3.096, which clearly indicates that the majority of respondents use high-energy consuming machines. The widespread use of high-energy-consuming medical equipment reflects the energy-intensive nature of healthcare delivery, where electricity is indispensable for diagnostics, treatment and life-support services.

Table 1: Descriptive results on impact of electricity tariff on healthcare sector

Questionnaire Items	Responses	Freq.	(%)	Mean	S.D
1. We have prepaid billing system	Strongly Disagree	5	7.7		
	Disagree	15	23.1		
	Agree	31	47.7		
	Strongly Agree	14	21.5		
	Total	65	100.00	2.831	0.867
2. We use high energy consuming machines.	Strongly Disagree	2	3.1		
	Disagree	13	20.0		
	Agree	26	40.0		
	Strongly Agree	24	36.9		
	Total	65	100.00	3.096	0.828
3. Our electricity tariff is affordable.	Strongly Disagree	20	30.8		
	Disagree	26	40.0		
	Agree	13	20.0		
	Strongly Agree	6	9.2		
	Total	65	100.00	2.891	0.957
4. Electricity billings affect our productivity.	Strongly Disagree	6	9.2		
	Disagree	13	20.0		
	Agree	28	43.1		
	Strongly Agree	18	27.7		
	Total	65	100.00	3.894	0.916
5. We incurred high medical costs due to increased electricity tariff.	Strongly Disagree	2	3.1		
	Disagree	9	13.8		
	Agree	32	49.2		
	Strongly Agree	22	33.9		
	Total	65	100.00	3.109	0.768

The third result presented in the table evaluated the perspectives of respondents regarding the affordability of electricity tariffs within the healthcare sector. The findings indicate that more than 70% of participants within the healthcare sector expressed disagreement regarding the affordability of electricity tariffs, whereas about 30% asserted that the current tariffs are affordable. The findings confirm that most respondents in the healthcare sector consider electricity tariffs as prohibitively expensive, with adverse implications for productivity and service delivery.

The fourth result in the Table evaluated the impact of electricity tariffs on productivity levels within the healthcare sector. The findings show that the rise in electricity tariffs has significantly impeded the productivity of a substantial majority (about 70.8%) of the participants. This is critical, given the essential role of the sector in safeguarding public health. Conversely, 29.2% of the respondents reported that the increase in electricity tariffs has not necessarily impacted their productivity levels. The mean score of 3.894 suggests that a substantial majority of respondents perceive that the increase in tariffs has notably influenced their productivity levels within the health sector. This outcome raises significant concerns for a developing nation such as Nigeria, particularly given the critical role of the healthcare sector in ensuring the overall wellbeing of her citizens.

The fifth result evaluated the impact of rising electricity tariffs on medical costs within the healthcare sector. The findings show that more than 83% of individuals within the healthcare sector have experienced elevated medical expenses as a result of the rise in electricity tariffs. Only 16.9% of the respondents suggested that the increase in electricity tariffs may not have been the exclusive factor contributing to the rise in medical costs. The mean score of 3.109 also suggests that a substantial majority of respondents concur that the rise in electricity tariffs has significantly contributed to increased medical expenses. This suggests that higher operating expenses are being transmitted to patients through increased service charges. Again, this outcome raises significant concerns for a developing nation such as Nigeria, where the health sector is crucial to the overall welfare of its populace. The comparative percentage responses obtained from each questionnaire item of the descriptive analysis is given in Figure 1.

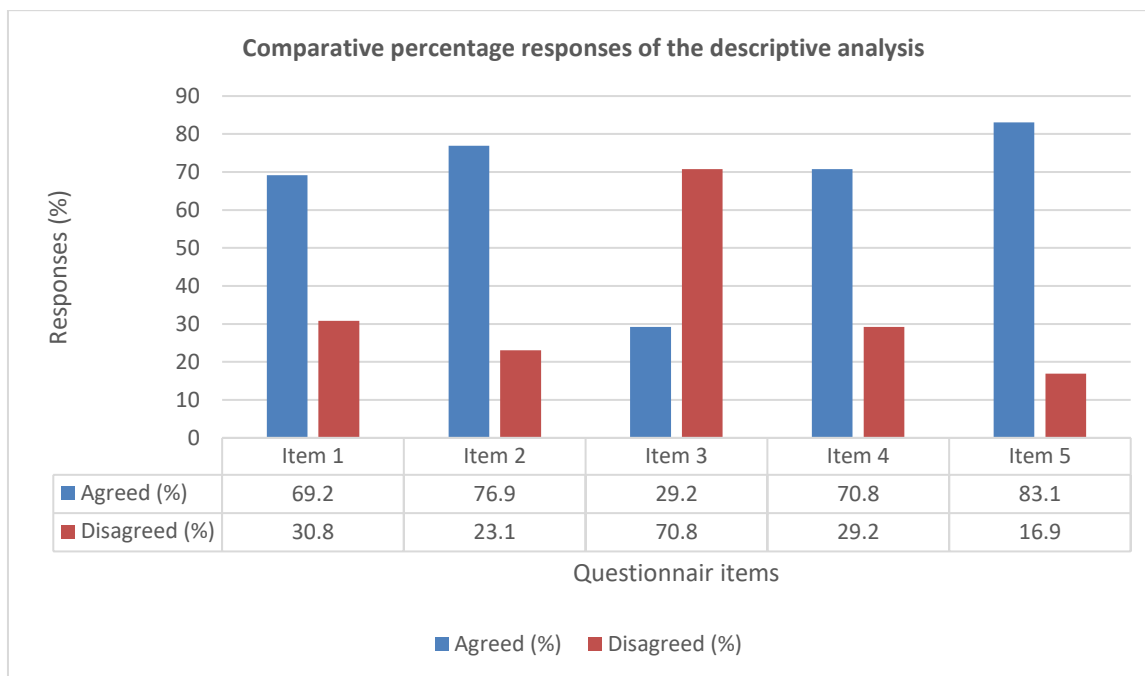


Figure 1: Comparison of responses to the questionnaire items

In summary, the findings of the descriptive results show the perspectives of the respondents concerning the implications of tariff increases on the healthcare sector in Nigeria. An interesting observation from this analysis indicates that while majority of organizations within the healthcare sector have adopted prepaid meters, the expense associated with their electricity tariffs remains significantly high. This has not only negatively influenced productivity levels, but also has led to increased medical expenses. Moreover, the standard deviation scores further support the notion that the responses were not significantly varied from the mean, as none of the results exhibited a score substantially exceeding 1.00. Consequently, the outcomes of the descriptive analysis were deemed satisfactory.

Table 2: Correlation result on impact of electricity tariff on healthcare sector in Nigeria

Correlations			
		Electricity Tariff	Health Sector
Electricity Tariff	Pearson Correlation	1	0.498**
	Sig. (2-tailed)		0.001
	N	65	65
Health Sector	Pearson Correlation	0.498**	1
	Sig. (2-tailed)	0.001	
	N	65	65

**Correlation is significant at the 0.01 level (2-tailed).

The Pearson product moment correlation analysis presented in Table 2, reveals a moderate but statistically significant positive relationship between electricity tariff increases and operating costs in the Nigerian healthcare sector, with a correlation coefficient of $r = 0.498$ at a 0.01 level of significance ($p < 0.01$). This result suggests a significant positive association between the increase in electricity tariff and the operational costs in the Nigerian healthcare sector. The result shows that increases in electricity tariffs are systematically associated with increases in healthcare operating costs, confirming that electricity pricing is a critical cost driver within the sector.

The regression results of the impact of electricity tariff on healthcare operations and delivery are given in Table 3. The results display the model summary and regression coefficients of the effect of increase in electricity tariff on the operating cost of the Nigerian healthcare sector. While correlation indicates that there is a substantial association between increase in electricity tariff and the operating cost of the health sector firms in

Nigeria, regression analysis demonstrates the degree of the relationship. According to the results, the R^2 value of 0.248 indicates that electricity tariff increment affects the operating cost of health sector in Nigeria, with a predictive capability of 24.8%. This means that increase in electricity tariff could increase the operating cost of health sector organisations in Nigeria by 24.8%. This level of explanatory power is substantial for a single predictor model and demonstrates that electricity tariff increments play a significant role in determining the cost structure of healthcare organizations in Nigeria.

Table 3: Regression results strength

Model Summary ^b						
Model	R	R Square		Adjusted R Square	Std. Error of the Estimate	
1	0.498 ^a	0.248		0.246	2.99932	
a. Predictors: (Constant), Tariff						
b. Dependent Variable: Health Sector						
Coefficients ^a						
Model	Unstandardized Coefficients	Standardized Coefficients		t	Sig.	
		B	Std. Error			Beta
1	(Constant)	7.672	1.402		5.473	0.000
	Tariff	0.474	0.092	0.498	5.139	0.000
a. Dependent Variable: Health Sector						

The econometric model for the relationship between electricity tariff (ET) and healthcare sector (HTC) could be reflected thus:

$$HTC = \beta_0 + \beta_1 ET + \mu \tag{1}$$

where: HTC = healthcare sector, ET = electricity tariff, β_0 is the constant, β_1 is the slope of the regression and μ = the error term.

Thus the regression model from the study is given as:

$$HTC = 7.672 + 0.498ET + 1.402 \tag{2}$$

Although other factors such as labor costs, medical supplies and maintenance expenses also influence operating costs, the results clearly establish electricity tariffs as a key contributor.

In summary, the inferential and regression results confirm that increased electricity tariffs significantly elevate operating costs in the healthcare sector. This escalation in costs has direct implications for productivity and service affordability, as healthcare providers may transfer increased operational expenses to patients through higher medical fees. Given the essential nature of healthcare services, these findings highlight the broader socio-economic consequences of electricity tariff policies in Nigeria and underscore the need for careful consideration of the health sector in electricity pricing reforms.

V. CONCLUSION

This paper concludes that increases in electricity tariffs have a significant and adverse effect on the operating costs of healthcare organizations in Nigeria. The inferential analysis confirms a statistically significant positive relationship between electricity tariff increases and healthcare operating costs, indicating that rising electricity prices are closely associated with higher operational expenditures within the sector. This relationship establishes electricity pricing as a key economic factor influencing the cost structure of healthcare service delivery in Nigeria. The regression results further demonstrate that electricity tariff increases explain a meaningful proportion of the changes observed in healthcare operating costs. This indicates that variations in electricity pricing (24.8%) account for a substantial share of the financial pressures faced by healthcare institutions, even when other operational factors are considered.

The findings suggest that electricity tariff increases directly translate into higher running costs for healthcare facilities, which may subsequently affect productivity, service efficiency, and the affordability of medical services for patients. Hence, the study provides strong empirical evidence that electricity tariff increases

constitute a significant economic burden on the Nigerian healthcare sector. Given the essential nature of healthcare services, sustained increases in electricity tariffs are likely to have broader physical and social implications by increasing medical costs and potentially limiting access to quality healthcare. Based on these findings, it is strongly recommended that future studies employ longitudinal analytical methods to examine how persistent changes in electricity tariffs influence healthcare operating costs, service delivery efficiency, and patient affordability over time. This will provide deeper insights to support evidence-based energy and health policy decisions.

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