



Impact of 2013 Tariff Billing Reforms on Economic Efficiency in Bwari Area Council of the Federal Capital Territory (FCT) Abuja

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ABSTRACT

This research investigates the economic inefficiencies arising from the Abuja Electricity Distribution Company's (AEDC) estimated billing practices for non-metered electricity consumers in Bwari Area Council, Federal Capital Territory, Nigeria. The study explores the adverse impacts of these practices on household incomes, small business performance, and consumer trust through the lens of the neoclassical economic theory of efficiency, consumer behavior, and the modern theory of electricity demand. The findings highlight that inaccuracies in estimated billing practices disproportionately affect economically vulnerable groups, thereby hindering local economic stability.

Employing a mixed-methods approach that integrates quantitative and qualitative data with content analysis, the research uncovers significant challenges associated with AEDC's estimated billing system. Overbilling and billing unpredictability not only erode consumer financial stability but also impair the operational efficiency of micro-, small-, and medium-sized enterprises (MSMEs). These inefficiencies exacerbate inequality, amplify socio-economic pressures, and fuel widespread consumer dissatisfaction.

To address these challenges, the study proposes several recommendations, including the implementation of universal prepaid metering, enhanced billing transparency, and targeted subsidies for vulnerable consumers. These interventions aim to improve fairness, restore trust, and foster economic inclusivity. By aligning with the United Nations Sustainable Development Goal 7 (affordable and clean energy for all), this research underscores the critical role of equitable energy distribution in fostering sustainable development and economic empowerment.

Key words: AEDC, Bwari, Estimated billings, Non-metered, Electricity consumers.

1. BACKGROUND TO THE STUDY

Historically, electricity in Nigeria was considered a public service, with households and rural users either receiving subsidies or not paying for electricity. However, the Electric Power Sector Reform (EPSR) Act of 2005 and subsequent privatization of 2013 introduced a more structured market with expectations of fair pricing for all consumers, including government institutions. Prior to these reforms, electricity tariffs were fixed for long periods despite rising costs, which led to NEPA operating at a monthly deficit of approximately ₦2 billion and a decline in reliable power supply (Gershon & Ezurum, 2017). This discouraged private investment and highlighted the need for a sustainable, transparent tariff regime.

The privatization of the Power Holding Company of Nigeria (PHCN) led to the creation of successor Distribution Companies (DISCOs), including the Abuja Electricity Distribution Company (AEDC), with the mandate to ensure transparent and efficient billing. The Nigerian Electricity Regulatory Commission (NERC) introduced the Multi-Year Tariff Order (MYTO) framework, aiming to balance investment needs with consumer affordability. However, issues persist, particularly with estimated billing for non-metered consumers, which has led to financial strain and consumer dissatisfaction due to the opaque billing practices (Adewumi & Eruaga, 2020). Estimated billing often results in higher charges for non-metered consumers, who lack real-time data to manage their energy use effectively, making budgeting challenging and increasing financial unpredictability (Akinbami & Sholarin, 2019).

Energy is essential to powering economic units and fostering sustainable economic growth, serving as a fundamental driver of productivity across sectors (Ayodele, 2001; Ubi & Effiom, 2013). The United Nations Sustainable Development Goal (SDG) No. 7 aims for universal electricity access by 2030, underscoring the importance of reliable, affordable electricity for sustainable development. Achieving this requires adequate generation, transmission, and distribution infrastructure and robust governance frameworks that ensure fair access to energy for industries, households, and public institutions alike.

Endowed with abundant primary energy resources like solar, hydro, wind, oil, gas, and coal, Nigeria has significant potential to meet domestic energy needs. For example, the country receives approximately 4.85 trillion kilowatts of solar energy daily and has extensive reserves of oil, gas, and coal (Odetunde, 2008; Solar Energy International, 2011; NUPRC, 2024). However, realizing this potential has been challenging due to inefficiencies and infrastructural limitations, particularly within the electricity distribution sector. The issues are acute in regions like Bwari Area Council, where non-metered electricity users are subjected to estimated billing. Factors such as meter shortages, installation delays, and population growth due to rural-urban migration exacerbate the challenges in billing accuracy and fairness (Adefulu, 2015). The lack of transparency and accuracy in billing affects low-income households and small businesses disproportionately, making it difficult for them to plan effectively and manage limited resources. These issues contribute to widespread consumer dissatisfaction and sometimes lead to disputes with AEDC (Adenikinju, 2017).

This study, therefore, investigates the extent to which estimated billing practices impact non-metered consumers' financial stability, operational efficiency, and overall trust in the system, with a focus on Bwari Area Council. Specifically, it examines the efficacy of regulatory policies and frameworks in addressing metering challenges and whether they have improved billing accuracy. By highlighting the broader implications of these issues, this research contributes to the understanding of how reliable energy access, transparency, and equitable pricing can stimulate sustainable economic growth and contribute to Nigeria's development agenda.

Despite having a clean balance sheet with no debt obligations at privatization, AEDC reported a net loss of ₦7.3 billion in 2022, an improvement from the ₦11.9 billion loss the previous year. Despite a revenue of ₦148.9 billion, this was a decline from ₦165.3 billion in 2021, largely due to reduced tariff shortfall awards and lower energy supplies from the national grid (AEDC-Signed-Financial-Statement, 2023). This performance indicates that AEDC did not meet its profit targets set by the Nigerian Electricity Regulatory Commission (NERC), underscoring the need for financial and operational improvements to meet NERC's benchmarks and ensure long-term financial health.

The objective of this study is to investigate the effect of estimated billing on non-metered electricity consumers in the Bwari Area Council.

2.0 LITERATURE REVIEW AND THEORETICAL FRAMEWORK

When examining the Nigerian economy as a whole, it becomes evident that the power sector has not performed well, despite substantial budget allocations. The empirical literature investigating the impact of estimated billing on non-metered electricity consumers in Nigeria highlights considerable challenges linked to this billing approach.

Ayomide (2024) explores the widening metering gap in Nigeria, highlighting a 10% quarter-on-quarter increase in estimated billing of customers from Q4 2023 to Q1 2024, reflecting ongoing challenges in adequately meeting all customers. The study employed a descriptive research technique using data from the National Bureau of Statistics (NBS), revealing that despite a modest 5% increase in metered customers, the number of customers on estimated billing continues to rise, leading to significant disputes between consumers and Distribution Companies (DisCos). Economically, this rise in estimated billing has resulted in collection losses for DisCos. The findings of the study suggest a need for comprehensive metering solutions to improve billing accuracy and customer satisfaction. The study's reliance on secondary data limited its ability to deeply analyze consumer behavior and the socio-economic impacts of estimated billing, leaving gaps in understanding the lived experiences of electricity users in Nigeria. While the research provided useful insights, the absence of primary data weakens the connection between its findings and the actual dynamics of consumer responses to billing systems. This reliance restricts the study's ability to capture actual behaviors, such as how consumers adapted to or resisted estimated billing, and the broader economic consequences on households. To strengthen its policy relevance and ensure a more grounded analysis, future research should

incorporate primary data, offering direct insights from consumers. This would validate the study's conclusions and provide a more comprehensive foundation for policy recommendations that address the real challenges faced by Nigeria's electricity users.

Okafor & Nwankwo (2024) studied the impact of estimated billing on small businesses in Nigeria, specifically focusing on companies in Abuja. Utilizing a case study approach, the researchers conducted in-depth interviews with small business owners to explore the financial implications of estimated billing. The findings revealed that the unpredictability associated with estimated electricity costs significantly undermines the financial stability of small businesses, as it complicates budgeting and limits opportunities for investment and growth. The economic implications of this unpredictability are profound, as it hinders the ability of small businesses to plan effectively, which is essential for sustainable growth and development. Regarding policy implications, the study advocates for the prioritization of metering of businesses to ensure more predictable and stable electricity costs, which could foster a more conducive environment for growth. While the case study approach offers valuable, context-specific insights, it did not fully represent the challenges faced by small businesses in other sectors or regions, thus limiting possible broad application of the findings.

Tunji (2024), in his work, explored the growing challenges in Nigeria's electricity sector, particularly focusing on the widening metering gap and the rise in the number of customers subjected to estimated billing. The theme of the work revolves around the inefficacy of current efforts to eliminate estimated billing, despite government initiatives aimed at bridging the metering gap by the end of 2024. The research primarily utilized descriptive techniques of analysis from the National Bureau of Statistics (NBS) which highlighted trends in metering and estimated billing across Nigeria's electricity distribution companies (DisCos). The findings report a significant 10% quarter-on-quarter increase in the number of customers on estimated billing in the first quarter of 2024, raising the total to 6.43 million. This rise contrasts with the modest 5% increase in metered customers within the same period, underscoring the persistent issues in achieving comprehensive metering coverage. Economically, the reliance on estimated billing exacerbates collection losses for DisCos, which struggle with reduced revenue collection—highlighted by a 1.13% decline in revenue from the previous quarter. This financial strain threatens the ability of DisCos to invest in infrastructure and improve service delivery. The policy implications are clear: there is an urgent need for accelerated metering efforts to ensure accurate billing, enhance revenue collection, and improve customer satisfaction. The study's relevance to contemporary Nigeria is underscored by the ongoing efforts to modernize the electricity sector, yet it also highlights the substantial obstacles that remain, particularly the financial and logistical challenges facing DisCos. Tunji's (2024) analysis offers valuable insights including the widening metering gap, with more consumers being billed based on estimations rather than actual consumption, which exacerbates inefficiencies and consumer dissatisfaction. While the study effectively details the financial impact on electricity distribution companies (DisCos) and the growth in estimated billing, it neglects to explore the socio-political factors that influence the success of metering implementation. Issues such as political will, governance challenges, and vested interests within the energy sector that may hinder progress are left unaddressed. Additionally, the study misses an opportunity to examine how consumers perceive estimated billing and its effect on their trust and payment behaviour, which could offer insights into compliance rates and market efficiency. A more balanced approach that integrates both quantitative data and the socio-political and behavioural aspects would provide a fuller understanding of the challenges in addressing Nigeria's metering gap and estimated billing issues.

Adebanji, Adeleye & Fasina (2023), in another breath, explored the broader implications of Nigeria's electricity sector privatization, particularly focusing on the inefficiencies that have persisted post-privatization, such as estimated billing. Their study employed both quantitative and qualitative and descriptive techniques where surveys were used in collecting data from primary and secondary sources. Their findings indicate that, despite the privatization reforms, there have been no significant improvements in the electricity sector. One notable outcome is the successful unbundling of the defunct Power Holding Company of Nigeria (PHCN) into various generation, transmission, and distribution companies. However, the reforms did not lead to substantial improvements in electricity generation or service delivery, similar to the pre-privatization period. The research concluded that privatization has not significantly improved the electricity supply, with challenges like inadequate metering and reliance on estimated billing continuing to affect consumers. The economic implications are dire, as the inefficiencies contribute to increased operational costs

and consumer dissatisfaction, further straining the sector's financial sustainability. Policy implications suggest an urgent need for implementing cost-reflective tariffs, widespread deployment of prepaid meters, and a review of privatization policies to ensure competent management of the sector.

The study rightly points out that despite reforms, Nigeria's electricity sector continues to struggle with corruption, technical incompetence, and financial mismanagement, signaling a need for a comprehensive overhaul. Corruption is evident in fund mismanagement and the exploitation of consumers through inflated, arbitrary estimated bills. Additionally, technical incompetence—stemming from outdated infrastructure, poor maintenance, and a lack of skilled personnel—worsens the situation, making efficient resource use nearly impossible. This results in frequent outages, poor service, and widespread consumer dissatisfaction. The reliance on estimated billing instead of accurate metering not only frustrates consumers but also leads to significant revenue losses, limiting the sector's capacity to invest in much-needed infrastructure upgrades. Consequently, this creates a cycle of unreliable electricity supply, stifling economic productivity and further straining the country's fragile economy. The study, however, does not fully explore these limitations or suggest concrete solutions for breaking this cycle.

This research, guided by the Asymmetry of Information Theory (Akerlof, 1970) highlights the imbalance of information between two parties, which can lead to inefficiencies in market operations. In the context of electricity billing, particularly estimated billing, this theory explains how consumers /users of lacked sufficient information about their actual electricity usage due to the absence of metering systems. Abuja Electricity Distribution Company (AEDC), on the other hand, has more control over the information regarding electricity consumption, leading to potential overcharging or undercharging. This imbalance creates distrust, inefficiency in resource allocation, and consumer dissatisfaction (Adebayo, 2021; Ugwu, 2023).

In the Bwari Area Council, the prevalence of estimated billing means that electricity consumers (households, MSMEs and corporate organizations), especially those in Bwari area Council do not have accurate data on their actual consumption, which can lead to inefficiencies such as overconsumption or underconsumption. The theory can help explain the misalignment between consumer expectations and AEDCs' actions, contributing to a comprehensive understanding of the socioeconomic impacts of estimated billing on consumers.

This theory is highly relevant as it directly addresses the key issues related to transparency, fairness, and trust in electricity billing systems, which are central to the study. By applying the Asymmetry of Information Theory, the research can effectively explore the dynamics between electricity providers and consumers, and propose solutions such as improved metering systems and transparent billing practices.

3. METHODOLOGY

The research is designed as a survey study, a micro-study specifically targeting non-metered electricity consumers in Bwari Area Council. The survey approach allows for data collection from a sample population and obtaining valuable insights into the impact of estimated billing on consumers. The study adopts both qualitative and quantitative methods, combining structured questionnaires and interviews to gather data.

3.1 Sample Size

The study used field investigation and distributed a total of two hundred fifty questionnaires (250) but received 155 questionnaires as presented and analyzed below, representing 62% of the distributed questionnaires. Some of the items in the questionnaires were ranked on a 5-point Likert scale by the responders (such as Very Satisfied, Satisfied, Undecided, Not Satisfied, and Very Dissatisfied on a scale of 1 to 5) to determine the main factors affecting unmetered electricity consumers in Bwari Area Council. The sample group was also subjected to interviews for improved data generation. The sample group included small and medium-scale businesses (85 responses), household consumers (55 responses), and educational institutions like Veritas University, Nigeria Law School, and JAMB office (15 responses). The sample size was chosen using Slovin's (1960) formula, which ensures a reliable representation of the population under study. Including household and institutional consumers allows for a broader understanding of how estimated billing affects different consumer categories. However, it has the advantage of reducing bias in the formation of the sample thereby enhancing adequate representation of the population by the sample.

The data collected were presented in tables for analysis.

Table 3.1 Research instrument showing a sample of distribution and analysis

S/N	Category of non-metered electricity consumers	Number of Questionnaires distributed	Number of Questionnaires received	% of questionnaires received
1	Veritas University, Abuja	05	05	3.2
2	Nigeria Law School Abuja	05	05	3.2
3	Jamb Office Abuja	05	05	3.2
4	Small and medium-scale businesses	135	85	54.5
5	Household non-metered consumers	100	55	35.4
	Total	250	155	100

Source: Field investigation by the author, 2024

Table 3.1 above shows that 250 questionnaires were distributed to the various categories of non-metered electricity consumers and only 155 questionnaires were received, which constituted 62% of the submissions. The different corporate institutions in Bwari Area council recorded 3.2% submission, small and medium scale enterprises recorded 55% and household electricity consumers recorded 35% submission. This implies that 62% of questionnaires were received and were statistically significant for our analysis.

3.2 Method of Data Collection and Sources of Data

The data used in this study are purely primary where structured questionnaires were used to elicit information from the targeted audience. The study is based on qualitative and quantitative methodology in which non-quantifiable information, facts, and opinions were obtained through purposive interviews and structured questionnaires. The questionnaires relating to economic and social institutions were designed and administered to random knowledgeable respondents from educational institutions, corporate organizations, and different categories of respondents through the assistance of some research assistants who were engaged to carry out this field survey within the Bwari Area Council.

3.3. Population

The survey population was drawn from different demographic groups, including individuals of various ages, marital statuses, professions, and educational backgrounds. This diverse sampling ensured that the study captured a wide range of perspectives on the impact of estimated billing on electricity consumers in Bwari.

3.4 Estimation Techniques

The estimation techniques were based on statistical methodologies using descriptive-analytical technique, content analysis technique and simple percentages. They were all utilized to analyse the data. It involves a technique for summarizing and presenting data to provide a clear and concise overview of its key features. Descriptive statistics aim to organize and simplify large datasets, facilitating easier interpretation and understanding of the data's characteristics. These methods are fundamental for gaining insights into the basic features of a dataset, helping researchers and analysts to describe patterns and variability in a succinct and meaningful way. These analytical techniques are advantageous for assessing large and small populations especially where a small population is to be derived from a large one, Onwumele (2018).



Table 4.1: Descriptive statistics

		q1	q2	q3	q4	q5	q6	q7	q8	q9	q10	q11	q12	q13	q14
N	Valid	155	155	155	155	155	155	155	155	155	155	155	155	155	155
	Missing	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mean		3.12	2.66	2.63	2.65	2.40	2.65	3.91	3.27	2.29	2.57	2.26	1.94	2.66	2.19
Std. Error of Mean		.088	.074	.077	.070	.074	.094	.054	.089	.074	.073	.079	.066	.072	.063
Median		3.00	3.00	2.00	3.00	2.00	2.00	4.00	4.00	2.00	2.00	2.00	2.00	3.00	2.00
Std. Deviation		1.095	.921	.954	.873	.916	1.171	.678	1.107	.919	.904	.986	.827	.899	.790
Variance		1.199	.848	.909	.763	.839	1.371	.459	1.225	.844	.818	.972	.684	.809	.625
Skewness		.084	.567	.161	.108	.505	.710	-.522	-.526	1.223	.203	1.520	1.656	.391	.760
Std. Error of Skewness		.195	.195	.195	.195	.195	.195	.195	.195	.195	.195	.195	.195	.195	.195
Kurtosis		-.890	.699	-1.069	-.816	-.608	-.548	.768	-.982	1.084	-.849	2.022	3.809	.098	.886
Std. Error of Kurtosis		.387	.387	.387	.387	.387	.387	.387	.387	.387	.387	.387	.387	.387	.387
Range		4	4	3	3	3	4	3	4	4	3	4	4	4	4
Minimum		1	1	1	1	1	1	2	1	1	1	1	1	1	1
Maximum		5	5	4	4	4	5	5	5	5	4	5	5	5	5
Percentiles	25	2.00	2.00	2.00	2.00	2.00	2.00	4.00	2.00	2.00	2.00	2.00	1.00	2.00	2.00
	50	3.00	3.00	2.00	3.00	2.00	2.00	4.00	4.00	2.00	2.00	2.00	2.00	3.00	2.00
	75	4.00	3.00	3.00	3.00	3.00	4.00	4.00	4.00	2.00	3.00	2.00	2.00	3.00	3.00

Source: Generated by the researcher from the SPSS,2024.

Table 4.1 shows the descriptive statistics for 14 variables used to elicit responses from the structured questionnaires (q1 to q14). The table shows the number of participants (155) with complete data for all 14 variables. There are no missing values (0) for any variable. The table provides a comprehensive overview of the data for each variable. The measures of central tendency (mean and median) indicate that most responses fall somewhere in the middle of the Likert's scale (between 2 and 4). The measures of spread (standard deviation and range) show some variability in the responses, while the measures of shape (skewness and kurtosis) suggest that the distributions are mostly symmetrical and flatter than a normal distribution for some variables. Finally, the percentiles offer a more detailed look at how the responses are distributed across the scale for each variable.

The Mean represents the average score for each variable. The means range from 1.94 (q12) to 3.91 (q7), indicating that the average responses for most variables fall somewhere between 2 and 4 (on a 5-point scale, assuming 1 is the lowest and 5 is the highest) while the median represents the middle value when all responses for a variable are

arranged in order. Similar to the mean, the medians range from 2 (q2, q4, q5, q6, q8, q9, q11, q12, q13, q14) to 4 (q3, q7), again suggesting scores concentrated around the middle of the scale. The standard deviation shows how much the data varies from the mean. A higher standard deviation indicates more spread in the responses (values further from the mean). The standard deviations range from 0.678 (q7) to 1.171 (q6), suggesting some variables have a wider range of responses than others. The Variance is the squared value of the standard deviation and reflects the total variability around the mean. The interpretation is similar to the standard deviation while the range shows the difference between the highest and lowest scores for each variable. All variables have a range of 4 (from 1 to 5), indicating that the entire range of the scale was used for responses.

The skewness measures the asymmetry of the data distribution. A positive skew indicates more data points concentrated towards lower values, while a negative skew indicates more data points concentrated towards higher values. Here, most skewness values are close to zero, suggesting a relatively symmetrical distribution for most variables. However, q12 (1.520) and q13 (1.656) have a positive skew, indicating a slight tendency for lower scores on those variables. While the kurtosis measures how peaked or flat the distribution is compared to a normal distribution. A negative kurtosis indicates a flatter distribution with fewer extreme values (both very high and very low scores). Here, most kurtosis values are negative, suggesting flatter distributions for most variables. However, q11 (2.022) and q13 (3.809) have positive kurtosis, indicating a slightly higher concentration of scores around the center compared to a normal distribution.

The Percentiles represent the values that divide the data into four equal quarters. The 25th percentile (Q1) is the value below which 25% of the scores fall. The 50th percentile (median) is the middle value. The 75th percentile (Q3) is the value below which 75% of the scores fall. Here, the percentiles provide more details about the distribution of responses within each variable. For example, for q1, we see that 25% of the scores are 2 or lower, 50% are 3, and 75% are 4 or lower.

4.2. Analysis of Responses from Questionnaires

The analysis of the responses is arranged in a manner to show how the fourteen (14) questions addressed the three (3) main objectives.

The following questions provided answers to objective one.

Question No 1. How would you describe the power supply available in your area?

The respondents were asked the number of hours of steady power supply in their area. (Twenty-four hours, Twelve hours, Eighteen hours, Six hours to three hours)

Table 4.2: Approximate Number of Responses on Billing System

Category of Respondent	Number of Respondents	Percentage (%)
Very satisfied (24hrs)	18	11.61
Satisfied (12hrs)	42	27.09
Undecided (8hrs)	43	27.74
Not satisfied (6hrs)	45	29.03
Very dissatisfied (3hrs)	7	4.51
Total	155	100

Source: Field Survey data by the author, 2024

Table 4.2: shows the number of respondents on the number of electricity hours to their residence, 18 respondents which constituted 11.61% clearly indicates that supply of electricity by the AEDC has been uninterrupted. But this percentages of responses could be attributed to those privilege few who were enjoying special line and under Band A, that could not be tampered with. 42 responses constituting 27.09% said the supply of electricity has been good. These set of electricity consumers were those on prepaid metering-package whose supply of electricity can only be touched

given certain unforeseen circumstances. From the analysis, it is observed that 43 respondents, which constituted 27.74%, were of the view that given the poor electricity power supply situation in the Bwari area council, the AEDC still bring estimated bills to them despite not having 24 hours of electricity and failure to pay usually result to disconnection of supply line which attracts extra charges for re-connection. The same situation applies to the number of respondents of 45 which constituted 29.03%. These set of electricity consumers experienced same situation with those who were having 8hours of electricity supply with the same status of reconnection.

Finally, from the table 4.51% of respondents clearly shows that the estimated billing system seriously affects the number of hours electricity is supplied to their areas thereby making the entire working day unproductivity given the kind of businesses they are involved inn which requires steady power supply.

The tabular presentation was also replicated in the graph, though it conveys the same information as generated in the table.

Question No 2: Does estimated billing have any effect on the quality of lives of the non-metered consumers in Bwari Area Council?

The respondents were asked if the estimated billing systems affect the quality of life in Bwari Area Council.

Table 4.3: Approximate number of responses on billing system

Category of Respondents	Number of Respondents	Percentage (%)
Very satisfied	9	5.81
Satisfactory	9	5.81
Undecided	70	45.16
Not satisfied	55	35.48
Very dissatisfied	12	7.74
Total	155	100

Source: Field Survey data by the author, 2024

From Table 4.3, it is observed that 5.81% of respondents were very satisfied with their quality of life in the Bwari Area Council, and an equal percentage were simply satisfied with the current billing system. Comparative analysis suggests that these respondents are likely postpaid consumers under Band A of the Abuja Electricity Distribution Company (AEDC), or they are connected to special lines, thereby avoiding the unmetered and estimated billing system. This trend indicates that such consumers are not significantly impacted by the issues prevalent in estimated billing.

Furthermore, the data reveals that 45.16% of respondents were undecided, reflecting fatigue and dissatisfaction with the AEDC's practice of issuing estimated bills. These respondents are often left without reliable electricity to power their operations yet face threats of disconnection if bills are unpaid. This uncertainty and frustration negatively impact their quality of life and economic prosperity.

A notable 55% of respondents expressed complete dissatisfaction. This group likely comprises unmetered electricity consumers who find themselves paying for more electricity than they consume, yet often lack sufficient power for their needs. This inefficiency affects their operations and economic activities. Lastly, 7.74% of respondents were very dissatisfied with their quality of life and economic prosperity. This dissatisfaction is exacerbated by the high cost of doing business in Nigeria and rising consumer inflation. The findings underscore that unmetered electricity consumers are being exploited by the AEDC, with insufficient regulatory oversight to address these issues. This exploitation not only hampers productivity and economic well-being but also poses a threat to the GDP of the local economy in Bwari and the nation at large. Small and medium-scale enterprises, which are key drivers of the economy, are particularly

affected, leading to a broader decline in productivity. Addressing corruption within the AEDC is crucial to mitigate this exploitation and improve the economic landscape for electricity consumers

To support this finding, a respondent advocated for: *“improvement in operational modalities of the AEDC in Bwari Area council the quality of lives is low with high bills.”* Another respondent commented thus: *“The issue of unmetered and estimated billing system should be taken care of as this issue has generated series of complaints from electricity consumers thereby affecting the quality of lives of the people in Bwari Area council.”* One of the respondents also stated that: *“The government can improve the Nigeria's electricity supply when the issue of corruption in the system is addressed and the electricity sector completely overhauled and addressed. This will now improve the quality of lives in Nigeria.”*

In addition, some interviewees who have over 10 years’ experience in welding, hairdressing and restaurant businesses in Bwari and Kubwa town respectively complained thus: *“There are challenges in terms of delivering quality and satisfactory services to their customers. The businesses can no longer pay salary to their workers as the cost of doing business is very high. Most of the operations are powered by alternative power source which requires either diesel or fuel to power their operations and the cost of buying those lubricants seriously affect the cost of doing the business which in turn affect cost of delivering their services and their quality of lives.”*

Question No 3: How satisfied are you with the current estimated billing system?

The respondents were asked to express their level of satisfaction with the existing estimated billing system. The survey gathered detailed feedback and measured the views regarding the estimated billing process by AEDC.

Table 4.4: Approximate number of responses on the estimated billing system.

Category of Respondent	Number of Respondents	Percentage (%)
Very satisfied	Nil	Nil
Satisfactory	27	11.42
Undecided	27	11.42
Unsatisfactory	82	52.90
Very unsatisfactory	19	12.26
Total	155	100

Source: Field Survey data by the author, 2024

Table 4.4 illustrates the impact of the estimated billing system on the standard of living of electricity consumers. None of the respondents indicated being very satisfied, although a small segment of the population saw no issues with the current electricity billing system. According to the data, 11.42% of respondents reported being satisfied, and an equal percentage were undecided. This suggests that despite the electricity billing system, most consumers struggle to find satisfaction with the services provided. Furthermore, 52.90% of respondents were completely dissatisfied, and 12.55% were dissatisfied. These percentages predominantly represent individuals involved in micro, small, and medium-scale enterprises, whose businesses rely on a steady and uninterrupted power supply.

Others who were dissatisfied likely include low-income earners whose livelihoods heavily depend on electricity. Despite the estimated billing system, these consumers still do not receive the level of service required to justify the payments demanded. The monthly salaries of low-income earners in Bwari are significantly impacted by the excessive estimated bills issued by the Abuja Electricity Distribution Company (AEDC) in the Bwari Area Council, contributing to their financial hardships.

Question No 4: To what extent do you agree that estimated billing affects your household budgeting?

The respondents were asked how the estimated bills affect their household budget.

Table 4.5: Approximate number of responses on household budget.

Category of Respondent	Number of Respondents	Percentage (%)
Very satisfactory	10	6.45
Satisfactory	10	6.45
Undecided	10	6.45
Unsatisfactory	105	67.74
Very unsatisfactory	20	12.90
Total	155	100

Source: Field Survey data by the author, 2024

Table 4.5 shows that 6.45%, 6.45%, and 6.45% of respondents, respectively, were strongly satisfied with their household budgeting. This implies that, despite the estimated bills issued by the AEDC in Bwari Area Council, these amounts did not affect their household budgets. These electricity consumers may either be cutting corners to sabotage the economy or colluding with AEDC officials in the Bwari Area Council to circumvent the process for their economic gain.

Conversely, a total of approximately 67.74% and 12.90% of respondents were not satisfied with how their family budgets were affected by the high estimated bills from the AEDC in Bwari Area Council. These outcomes suggest that electricity consumers in Bwari Area Council were facing significant challenges. To remain connected to electricity, they had to pay high fees, yet the electricity supply was not efficient.

One of the interviewees stressed that: *“There is need for a critical review of AEDC.”* Surprisingly, a respondent stressed the need to *overhaul the AEDC in Bawri area council as they were established to make money from the electricity consumers without providing efficient services for people to have value for their money.* A respondent expressed his view this way: *“Introduction of prepaid meters is highly politicized and not within the reach of the common man. Even the acquisition of a prepaid meter does not guarantee a steady power supply.* Another respondent posited that: *“The system is corrupt as most officers in AEDC are not well trained to do the work.”*

Question No 5: How does estimated billing affect the income of non-metered electricity consumers in Bwari Area council?

The respondents were asked if the estimated billing system affect the income of unmetered consumers in the Bwari Area council?

Table 4.6: Approximate number of responses on the income of unmetered consumers

Category of Respondent	Number of Respondents	Percentage (%)
Very good	Nil	Nil
Good	38	24.52
Undecided	36	23.23
Bad	67	43.23
Worse	14	9.03
Total	155	100

Source: Field Survey data by the author, 2024

From Table 4.6, it is evident that none of the respondents indicated dissatisfaction with their income being affected by the estimated billing system. This suggests that those whose incomes are impacted by estimated billing are the most vulnerable members of society, including individuals involved in small and medium-scale businesses or those with

low incomes.

Conversely, 24.51% of respondents rated their experience as "good." This group likely comprises high-profile electricity consumers such as Veritas University, the Nigeria Law School, and the JAMB office. These entities, although unmetered, provide essential services to the community and are less affected by the estimated billing system in terms of income and internally generated revenue. This is largely because their electricity bills are often negotiated at discounted rates, mitigating the financial impact of estimated billing on their operations. Additionally, 23.22% of respondents were undecided about whether estimated billing affected their income. These respondents fall into the same category as those whose responses constituted 24.51%. Furthermore, 43.22% of respondents agreed that the situation is very bad, with 67 responses being the highest indicating that the unmetered estimated billing system affects their daily income, especially for those involved in small and medium-scale enterprises (SMEs). Most of these businesses rely on electricity from the AEDC to power their operations, and when such electricity is unavailable, they face estimated bills at the end of the month along with threats of disconnections and additional reconnection charges. This significantly impacts the income generated at the end of the month. Often, such SMEs revert to alternative power sources to continue their operations, but when generators break down and there is no electricity, it further affects the businesses. As a result, customers do not receive the required services, thereby impacting the businesses' income. Finally, the analysis indicates that 9.03% of respondents described the situation as being very bad because, despite the estimated billing, electricity consumers still do not receive the required services from the AEDC, severely affecting their income in the Bwari area council.

To further support this finding, a respondent who lives in Kubwa village advocated for: *“overhauling of the AEDC in Bwari Area council. This is because even when there is no light, AEDC still send estimated bills to customers and always ready to disconnect if the bills are not paid on time.”* Another respondent commented thus: *“The government should look into the cases of incessant disconnection and reconnection with extra charge as these actions adversely affect the income of people. When people are looking for money to eat and pay school fees, AEDC will be compounding the problem by inflicting pains on unmetered electricity consumers.”*

In addition, some low-income earners who reside at the Zuma 1 and 2 villages, respectively, seriously complained about the attitudes of the AEDC members of staff regarding the issues of light and associated challenges in paying and not paying bills at all. Most of the business operators also complained of extra charges on their business operations by the AEDC management, which could be attributed to the estimated billing system. All these actions affect the income of the unmetered consumers in Bwari Area Council.

Question No 6: How frequently do you experience discrepancies between your actual usage and estimated bills?

The respondents were asked how frequently they experience discrepancies in electricity interruptions.

Table 4.7: Approximate number of responses on discrepancies.

Category of Respondent	Number of Respondents	Percentage (%)
Very frequently	24	15.48
Frequently	98	63.23
Undecided	28	18.06
Not frequently	5	3.23
Rarely	Nil	Nil
Total	155	100

Source: Field Survey data by the author, 2024

In Table 4.7, the percentage of responses varies. 15.48% of respondents reported experiencing very frequent interruptions when comparing estimated bills to actual electricity usage. These consumers, who are on post-paid and prepaid billing systems, still complain bitterly about discrepancies in their billing. Meanwhile, 63.23% of respondents stated that they frequently experience discrepancies in their electricity supply, particularly concerning estimated bills

versus actual usage. This group consists of MSMEs whose income relies heavily on electricity to power their businesses. The level of discrepancies in electricity supply is very concerning, as the AEDC frequently cuts off power while issuing excessively high estimated bills for consumers to pay.

Furthermore, 18.06% of respondents were undecided. This group likely consists of a class of electricity consumers whose primary concern is having power and who are unable to identify discrepancies between estimated bills and actual usage. Additionally, 3.22% claimed that discrepancies are infrequent. These respondents are likely consumers in Band A supply lines, which are specially connected lines that cannot be tampered with at will. Lastly, 8.38% of electricity consumers in the Bwari Area Council reported that such discrepancies are rare, according to the AEDC.

Question No 7: To what extent do you believe estimated billing contributes to energy conservation?

The respondents were asked if the estimated billing contributes to energy conservation.

Table 4.8: Approximate number of responses on energy conservation.

Category of Respondent	Number of Respondents	Percentage (%)
Strongly agree	10	6.45
Agree	82	52.90
Undecided	12	7.74
Disagree	42	27.10
Strongly disagree	9	5.81
Total	155	100

Source: Field Survey data by the author, 2024

Table 4.8 clearly shows the percentages of responses regarding energy conservation. According to the data, 6.45% of respondents believe that the estimated billing system contributes to energy conservation. These respondents are likely electricity consumers with energy-saving bulbs using prepaid meters. Additionally, 52.90% of respondents share this view, belonging to the same category as the 6.45%.

Meanwhile, 7.74% of respondents were undecided. This group seemed to be unaware of the differences between energy conservation and estimated bills; some of them, involved in MSMEs, do not use bulbs in their operations, instead connecting welding machines and equipment directly to the power source. Their primary concern is having a constant power supply without interruptions. Finally, 27.09% of respondents disagreed, stating that there was no difference between energy conservation and estimated bills.

Finally, 5.80% strongly shared the same vision with those respondents who disagreed on estimated bills and energy conservation.

Question No 8: How would you rate the affordability of electricity bills under the current estimated billing system?

The respondents were asked on the affordability of electricity bills.

Table 4.9: Approximate number of responses on accurate electricity usage.

Category of Respondent	Number of Respondents	Percentage (%)
Very affordable	3	1.94
Affordable	10	6.45
Undecided	Nil	Nil
Not affordable	103	66.45
Very unaffordable	39	25.16
Total	155	100

Source: Field Survey data by the author, 2024

In terms of affordability of electricity bills, Table 4.9 shows that only 1.93% and 6.45% of respondents could afford electricity conveniently under the estimated billing system. This indicates that, despite the estimated bills issued by the AEDC in Bwari Area Council, these amounts did not affect their purchasing power.

Conversely, approximately 66.45% and 25.16% of respondents could not afford electricity under the current estimated billing system. These outcomes suggest that these percentages of electricity consumers in Bwari Area Council are likely below the poverty level, struggling to make ends meet given the current austere economic situation in the country.

Graphically, the information from the table can be replicated thus:

Question No 9: How effective do you believe estimated bills are encouraging investment in renewable energy technologies?

The respondents were asked on the effectiveness of the estimated bills on investment on renewable energy.

Table 4.10: Approximate number of responses on investment.

Category of Respondent	Number of Respondents	Percentage (%)
Very Satisfactory	5	3.23
Satisfactory	19	12.26
Undecided	61	39.35
Dissatisfactory	59	38.06
Very Dissatisfactory	11	7.10
Total	155	100

Source: Field Survey data by the author, 2024

According to Table 4.10, the findings show that, due to the various challenges faced by electricity consumers regarding estimated billings and poor service delivery, high-profile investors had begun investing in renewable energy technology to guarantee energy efficiency. However, the cost of acquiring this energy for businesses and private use remains very expensive, and most Nigerians, especially those in Bwari Area Council, could not afford the technology due to the precarious economic situation in the country.

From the table, only 3.22% and 12.25% of respondents believed that the current estimated billing regime in Bwari Area Council seriously encouraged investment in renewable energy technology. Meanwhile, 39.35% of respondents were undecided. In contrast, 38.06% and 7.09%, respectively, believed it was not effective due to the high cost of acquiring or investing in renewable platforms. Many could not afford or understand the wattage system of these renewable energies to power their businesses or homes. These respondents are those whose standard of living had been adversely affected by the cost of estimated billing, yet they still did not have an efficient supply of electricity.

Some of the respondents could not afford the high cost of these renewable energy technologies while others feel that it could be vandalized thereby inflicting additional cost on them.

4.7. Discussion of Major Findings

- i. The descriptive statistics provided a comprehensive overview of the data for each variable. The average scores (mean and median) show that most responses are around the middle of the possible range (between 2 and 4). There was also some variation in the answers (standard deviation and range), and the way the data was spread out were not perfectly symmetrical for all the variables (skewness and kurtosis). The percentiles gave us a more precise picture of how the answers were distributed across the scale for each variable.
- ii. A concern identified in the analysis was related to certain practices among some AEDC members of staff. Some participants suggested that some staff members might have collaborated with unmetered consumers in a way that negatively impacted the economy, possibly by facilitating unauthorized connections and bypassing official procedures for personal benefit.

- iii. Unmetered bills are based on estimates, which could lead to unexpected fluctuations in consumers' monthly electricity costs. This could make it difficult to budget effectively, as the nonmetered electricity consumers might not know exactly how much they owed each month. If the estimate was higher than their actual usage, such a consumer could be overpaying for electricity. This could strain their budget and leave them with less money for other needs. Without actual meter readings, it's harder to pinpoint areas where such a consumer might be using excessive electricity. This makes it challenging to identify opportunities for conservation and potentially lower their energy bills.
- iv. The study revealed that AEDC's operational methods are not digitalized, relying instead on an analogue system to serve unmetered electricity consumers in Bwari Area Council. As a result, consumers receive estimated and often inaccurate bills each month. This situation impacts the monthly income of low- and middle-income earners, who must allocate a significant portion of their earnings to pay these estimated electricity bills. This increases their financial strain and makes it challenging to meet other family needs. Additionally, electricity is sometimes not provided, yet consumers still receive estimated bills and face threats of disconnection along with extra charges for reconnection. These practices affect the monthly budgets and incomes of unmetered electricity consumers in Bwari Area Council.
- v. The study found that estimated bills in Bwari Area Council do not accurately account for seasonal changes in electricity usage, such as increased consumption during hot weather. If household occupancy increases or someone begins working from home, electricity usage is likely to rise, but estimated bills may not reflect these changes promptly. The use of air conditioners during hotter months can also significantly increase consumption. Additionally, while replacing old appliances with energy-saving models can reduce usage, it may take several billing cycles for this to be reflected in the estimated bills.

5. SUMMARY OF MAJOR FINDINGS

This study investigated the effect of estimated billings on non-metered electricity consumers in the Bwari area council of the Federal Capital Territory (FCT) Abuja from 2013- 2023. This period is justified on the ground that policy formulation and implementation before unbundling of the Nigeria Electric Power Authority (NEPA) into eighteen (18) successor companies, corporatization of the companies, privatization and transfer to a private-sector run regime, and post-privatization outcome/issues cover this period.

In the literature review, we were able to show the relationship between the services of the AEDC in the Bwari area council on the well-being of non-metered customers as various studies were reviewed and cited in the literature. Drawing on a theoretical framework grounded in Asymmetry of Information and Principal-Agent Theories, the study incorporates empirical insights through experimental approaches, examining individual decision-making in response to policy changes. The research emphasizes the fairness and net impacts of adjustments in electricity tariffs, utilizing concepts such as Pareto efficiency and cost-benefit analysis. Understanding how estimated billing affects household finances and overall satisfaction levels was crucial for establishing a fairer billing system. In addition, the research addressed a notable gap in the literature by investigating the influence of estimated billing on the operational efficiency of Micro-, Small-, and Medium- Enterprises (MSMEs). Recognizing their pivotal role in local economies, understanding how billing practices impact their day-to-day operations was of paramount relevance and made a positive contribution to the growth of knowledge on the matter in society.

However, the methodology used in the study gave us the various procedures to be adopted in the study. The dissertation is a survey study and qualitative and quantitative data were subjected to statistical analysis using different estimation techniques of analysis in which non-quantifiable information, facts and opinions were obtained through purposive interviews and structured questionnaires were used for the analysis. The questionnaires relating to economic and social institutions were designed and administered to random knowledgeable respondents from educational institutions, corporate organizations and different categories of respondents through the assistance of some research assistants who were engaged to carry out this field survey within Bwari Area council. Using a mixed or blended methodology, the qualitative data gathered were used to complement the responses received through questionnaires. The study combined surveys on community perceptions and social networks with in-depth interviews and focus group discussions for qualitative insights into individual experiences.

The variables under consideration in the study were the quality of lives of unmetered electricity consumers, income and efficiency of production of the MSME's. The variables were used to design the structured questionnaires which were subjected to analysis using the various estimation techniques mentioned in chapter three.

5.2 CONCLUSION

The empirical analysis conducted during this study, covering AEDC in the Bwari area council from 2013-2023, provided answers to the research questions by examining the impact of estimated billings on unmetered electricity consumers. The study concluded that unmetered electricity consumers were significantly affected by AEDC's estimated billings. It was also found that increases in these estimated bills negatively impacted the MSMEs by raising business and service delivery costs. The findings indicated that fluctuations and questionable practices affected the monthly budgets and incomes of these unmetered electricity consumers.

5.3 Policy Recommendations

1. AEDC should procure and roll out meters in line with the National Mass Metering Programme (NMMP) of the Federal Government. This will empower consumers to monitor their consumption and make informed decisions. In areas where meters are not yet available, AEDC should ensure that communication regarding billing terms, charges, and rate changes is clear and concise.
2. To mitigate disputes between AEDC and unmetered electricity consumers, AEDC should disclose the estimated accuracy range of bills and the factors considered during estimation. Furthermore, the process for meter installation should be simplified. This could involve streamlining applications, reducing wait times, and offering financing options to make it easier for consumers to transition to metered billing.
3. AEDC can work with the federal government to provide financial assistance programmes for low-income households to help them manage their electricity bills. This could include direct bill subsidies or vouchers for prepaid electricity plans. Additionally, AEDC should launch awareness campaigns to enlighten non-metered consumers about energy efficiency practices, such as using appliances efficiently, reducing standby power consumption, and adopting energy-saving habits.

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