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Assessing Impact of Cost-Reflective Tariffs by ZESCO on Low-Income Households in Lusaka District between 2021 and 2026

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Abstract

Access to affordable and reliable electricity is essential for improving livelihoods and fostering social and economic development, especially in developing countries. Electricity allows productive economic activities and supports education and healthcare delivery as well as enhances household welfare. In Zambia, electricity supply is mainly generated from hydropower, making the sector highly vulnerable to climate variability and prolonged droughts. The national utility company, ZESCO, has been grappling with several challenges that hinder the consistent delivery of electricity. These challenges include financial constraints, aging infrastructure, and the adverse impacts of climate change on hydropower generation. The specific objectives of the study were to establish the changes in ZESCO tariffs over a five-year period between year 2021 and 2026, to assess the impact of cost-reflective tariffs on the socio-economic well-being and quality of life of low-income households in Lusaka District between 2021 and 2026, and to explore strategies that can be adopted by low-income households in response to increased electricity costs. The researcher adopted a mixed approach and employed qualitative and quantitative research designs. According to the 2022 Census of Population and Housing, Kanyama Constituency had an estimated total population of approximately 525,902 people, making it the largest of the three study sites. Mandevu Constituency followed with about 467,744 residents, while Chawama Constituency had around 208,419 residents in the same census period. The sample size was approximately 384 households. In addition to the quantitative survey, 10 - 15 low-income households were purposively selected for in-depth qualitative interviews. The research comprised questionnaires and interview schedules. The questionnaires were used because they are the main means of collecting quantitative data. The questionnaires enabled quantitative data collected in a standardized manner to ensure the data is consistent and coherent for the analysis. From the findings, the study concludes that the introduction of cost-reflective tariffs led to increased financial pressure on households. The study also found that 70% of households reduced electricity usage following tariff increases. This is strong empirical evidence of price responsiveness, particularly among low-income households. The study provides important insights into how households reduce electricity usage: cooking with an electric stove (32.7%), ironing (29.3%), use of a fridge/freezer (13.0%), and lighting (7.6%). The reduction in cooking using electricity is particularly significant. This suggests a shift to alternative fuels such as charcoal or firewood, which has serious environmental and health implications. A significant proportion of households (64.5%) reported avoiding electricity use during peak hours. This suggests adaptive behaviour in response to tariff structures or cost pressures. This behaviour is consistent with findings from dynamic pricing studies (Pereira & Marques, 2023), which show that households shift usage to reduce costs. The study further indicates that over 70% of households rely on traditional biomass energy sources (charcoal and firewood), which are generally cheaper but environmentally and health-wise harmful. The logistic regression results show that borrowing money to pay electricity bills is relatively widespread, with 52.7% of households reporting this behaviour. However, the baseline (constant-only) model demonstrates no predictive power, as it classifies all households as borrowers, reflecting only the majority category rather than meaningful relationships.

Keywords: Cost-Reflective Tariffs, Household Socio-Economic, Electricity Consumption Behaviour, ZESCO

1. Introduction and Background

Access to affordable and reliable electricity is essential for improving livelihoods and fostering social and economic development, especially in developing countries (Batidzirai B., Moyo A. and Kapembwa M. 2018). Electricity allows productive economic activities, supports education and healthcare delivery as well as enhancing household welfare. In Zambia, electricity supply is mainly generated from hydropower, making the sector highly vulnerable to climate variability and prolonged droughts. The national utility company, ZESCO, has been grappling with several challenges that hinder the consistent delivery of electricity. These challenges include financial constraints, aging infrastructure, and the adverse impacts of climate change on hydropower generation (ERB, 2023).

The Southern African Development Community (SADC)'s Protocol on Energy and successive ministerial decisions prioritized transitioning to cost-reflective electricity tariffs to enhance utility sustainability and investment. However, progress among member states has been uneven (SADC, 2018).

Even though, SADC set targets for full cost-reflective tariffs by 2013 and reaffirmed them for 2019, many member states have struggled to meet these goals due to affordability concerns and potential impacts on low-income households (ESERA, 2021). By the early 2020s, only a few countries, such as Namibia and Eswatini had fully implemented cost-reflective tariffs, while most continued using lifeline or pro-poor tariff structures to protect vulnerable consumers during the transition (SADC Annual Report, 2020–21; SADC Secretariat, 2017).

Globally, electricity sector reforms show that achieving full cost recovery through tariffs remains difficult. While cost-reflectivity has improved in many countries, most still face challenges in covering total service costs, reflecting the tension between financial sustainability and social objectives (Huenteler et al., 2020).

In an effort to address these issues and enhance ZESCO's financial viability, the government of Zambia introduced cost-reflective tariffs. While these measures are consistent with international best practices, regional recommendations by the Southern African Development Community (SADC) and also ensure long-term sustainability, they have raised concerns about the potential burden on low-income households.

According to the Policy Monitoring and Research Centre (PMRC, 2019), the implementation of cost-reflective tariffs has disproportionately affected urban households with limited incomes, particularly in places like Lusaka. Rising electricity costs may compel such households to reduce consumption, resort to unsafe alternative energy sources, or cut back on essential needs such as food, education, and healthcare. Recent data from the Zambia Statistics Agency indicates that approximately 64% of the population lives below the international poverty line of USD 2.15 per day, reflecting widespread income deprivation (ZamStats, 2022). This implies that the majority of households already struggle to meet basic needs such as food, housing, education, and health services. In such a context, increases in electricity tariffs are likely to be regressive, disproportionately affecting low-income households who spend a larger share of their income on basic services.

Given this context, it is imperative to examine the impact of cost-reflective electricity tariffs on low-income households in Lusaka District. This study seeks to explore changes in electricity consumption patterns, the coping mechanisms adopted by affected households, and the broader implications for their socio-economic well-being.

1.2 Statement of the Problem

Despite concerted efforts by various stakeholders to ensure the long-term sustainability of ZESCO through the implementation of cost-reflective tariffs, evidence suggests that these measures disproportionately affect low-income households. An analysis by PMRC (2019), indicates that a 75% increase in electricity tariffs has the most significant impact on the poorest households, whose real or disposable income is likely to be eroded by up to 13%, compared to only a 6% reduction for the wealthiest. The direct effect on real incomes is also more severe for the poorest (9%) than for the richest (3%). These rising tariffs may result in reduced access to electricity, deepening energy poverty and an increased reliance on unsafe alternative energy sources. Such outcomes threaten to reverse socio-economic development gains, diminish the quality of life and further strain the welfare of low-income households in Lusaka District.

While previous studies have largely concentrated on the technical and economic rationale for implementing cost-reflective tariffs, emphasizing their role in enabling ZESCO to meet operational costs, attract investment, and expand service coverage. Pambwe, et al., (2021) says that there remains a critical gap in understanding the social and economic impacts of these tariffs on vulnerable urban populations. Despite the regional push for cost-reflective electricity tariffs, little is known about how these tariffs affect the socioeconomic well-being of low-income households. This study seeks to fill that gap by examining the socioeconomic effects of cost-reflective tariffs on low-income households in Lusaka District.

2. Literature Review

2.1 Previous Studies

Cost-reflective tariffs refer to electricity prices that fully account for the cost of electricity generation, transmission, distribution and maintenance of infrastructure (Sovacool, 2017). According to the World Bank (2019), cost-reflective pricing is essential for ensuring the financial sustainability of electricity utilities, reducing reliance on government subsidies and attracting private investment into the energy sector. Recent studies further support this view, noting that cost-reflective tariffs improve operational efficiency and long-term viability of utilities, particularly in developing countries where under-pricing has historically led to financial deficits (Huenteler et al., 2020; Trimble et al., 2016).

Though, economically efficient, cost-reflective tariffs may have regressive effects, predominantly in situations where a large proportion of the population has low and unbalanced incomes. In such cases, tariff increases disproportionately affect poor households who spend a higher share of their income on basic utilities such as electricity. Empirical evidence suggests that without adequate social protection mechanisms, such pricing reforms can worsen energy poverty and inequality, as low-income households have limited capacity to absorb rising energy costs (Bouzarovski & Tirado Herrero, 2017; Carley et al., 2022).

Energy Poverty

Energy poverty refers to the inability of households to access or afford adequate, reliable and safe energy services essential for basic living standards (Bouzarovski & Petrova, 2015). Energy poverty manifests through inadequate electricity consumption, frequent disconnections and reliance on traditional or unsafe energy sources such as charcoal and firewood. Studies indicate that rising electricity tariffs can exacerbate energy poverty among low-income households by forcing them to reduce consumption or switch to inferior energy sources, with negative implications for health, education and overall well-being (Boardman, 2010; Bouzarovski, 2014).

Electricity Consumption Behaviour

Electricity consumption behaviour refers to how households use electricity in response to factors such as income, prices, household size and mindfulness of energy costs (Deaton & Muellbauer, 1980). Household Economic Theory suggests that when electricity prices increase, households adjust their consumption by reducing usage, shifting demand to off-peak periods or substituting electricity with alternative energy sources (Becker, 1965).

Empirical evidence shows that low-income households exhibit higher price sensitivity compared to wealthier households, making them more vulnerable to tariff increases (Fell et al., 2014).

Household Coping Mechanisms

Household coping mechanisms are strategies adopted to manage the financial stress associated with increased electricity costs. These may include reducing electricity usage, cutting expenditure on other essential goods, sharing electricity connections, or switching to cheaper but environmentally harmful energy sources (Pachauri & Rao, 2013). While such strategies may provide short-term relief, they often have long-term negative consequences, including increased health risks, reduced educational outcomes, and environmental degradation (WHO, 2018).

Global Experiences (Excluding Africa)

Studies from Asia, Europe and Latin America demonstrate that electricity tariff reforms aimed at achieving cost-reflectivity often lead to reduced electricity consumption among low-income households. In India, it was revealed that price increases significantly reduced electricity consumption among poor urban households, while wealthier households were less affected. A major systematic review of income and price elasticities in household electricity demand showed that higher electricity prices tend to reduce consumption pattern and behaviour (Rahmati et al., 2024).

In Latin America, empirical research on changes in tariffs revealed that tariff reforms improved utility financial performance but increased affordability challenges for low-income consumers, particularly in the absence of targeted subsidies (Pereira & Marques, 2023). It further revealed the mixed welfare outcomes. Time-of-use (ToU) and critical peak pricing (CPP) schemes have shown to reduce the number of households in energy poverty, while more complex dynamic pricing models (e.g., real-time pricing) can increase energy poverty, underscoring how tariff design deeply affects low-income households' welfare. And according Rahmati 2024 direct studies of tariff reform in Latin America, Asia, and Europe focusing on low-income household welfare are less, broader elasticity research and simulation models repeatedly confirm that higher electricity prices generally decrease consumption and exert downward pressure on household welfare, especially for lower-income groups with limited capacity to absorb increased costs.

Another analysis from Saudi Arabia indicates that recent tariff revisions were associated with measurable reductions in residential electricity consumption, suggesting that tariff adjustments can influence household behaviour and may amplify conservation responses under certain conditions (Nahiduzzaman et al., 2023). Collectively, these global studies illustrate that electricity tariff reforms and price increases often lead to reduced household consumption and can exacerbate energy affordability constraints, particularly in the absence of supportive social policies and consumer protections.

African Region (Excluding Zambia)

In Sub-Saharan Africa, empirical evidence from contemporary African research further shows that electricity tariff changes influence household consumption and welfare outcomes. A systematic review of electricity tariff reforms in Africa reported that tariff changes and structural reforms have significant implications for consumers, particularly where electricity prices are already high relative to incomes and where subsidies are being reduced or removed (Klug et al., 2022). In urban Ethiopia, household electricity demand was found to be highly inelastic, yet consumption fell following tariff increases, indicating that even modest price reforms can affect consumption patterns (urban Ethiopia study, 2022). Such inelasticity suggests that low-income households may reduce usage only slightly but still face greater financial burdens, as electricity remains a necessary good.

In Ghana, according to Adusah-Poku and Takeuchi (2019) reported that rising electricity tariffs disproportionately affected poor urban households, forcing them to allocate a larger share of income to energy expenses. In Kenya, studies have shown that electricity price increases led to reduced household consumption and increased reliance on alternative energy sources such as kerosene and charcoal, particularly among low-income households (Lee, Miguel, & Wolfram, 2016). In Nigeria, tariff reforms under the power sector recovery programme were associated with increased energy expenditure burdens among poorer households, highlighting affordability challenges in the absence of effective subsidy targeting (Ayodele, Ogunjuyigbe, & Alao, 2021).

In South Africa, empirical studies provide evidence that higher electricity prices are associated with decreased consumption and increased pressure on household energy budgets, though demand remains inelastic. Moreover, welfare analysis shows that increases in electricity costs can reduce households' disposable income and divert spending from other

essentials such as food, demonstrating important welfare trade-offs from tariff reforms (Setshedi & Mah, 2025). Additional evidence from Tanzania indicates that tariff adjustments have led to measurable declines in electricity usage among low-income households while increasing the share of income spent on energy (Bishoge, 2019).
Overall, this African body of evidence collectively underscores that tariff reforms especially those that increase prices tend to reduce electricity consumption and heighten affordability challenges for low-income households, reinforcing the need for equity-focused tariff designs and protection mechanisms to mitigate adverse welfare impacts.

Zambia

In Zambia peer-reviewed empirical literature on household-level impacts of tariff reforms is limited, underscoring a significant research gap. However, the best available quantitative evidence indicates that large residential electricity price increases have disproportionate welfare effects on low-income households. Partial equilibrium simulations revealed that substantial tariff hikes can reduce real household expenditures more drastically among the poorest households compared to wealthier group (welfare effects of price hikes, 2019). And most studies on electricity tariffs have largely focused on the financial sustainability of ZESCO and the technical justification for cost-reflective pricing (PMRC 2019). It was found that electricity tariff increases significantly reduce the disposable income of poor households, with the poorest experiencing the greatest welfare losses.
Batidzirai et al. (2018) examined willingness to pay for improved electricity reliability among urban enterprises but did not focus on household welfare. Similarly, Pambwe et al. (2021) assessed efforts to reduce power outages in high-density areas, with limited analysis of affordability and coping mechanisms among households.
This suggested a clear gap in household-level, welfare-focused research on the social impacts of cost-reflective tariffs in Zambia, particularly within urban low-income communities. The relative scarcity also of recent peer-reviewed studies focusing on household welfare, coping strategies, and distributional outcomes in Zambia highlights the critical empirical gap that this study seeks to address.

Discussion of Literature Reviewed

The reviewed literature shows that although cost-reflective tariffs are crucial for the financial sustainability of electricity utilities, they normally impose a disproportionate burden on low-income households. Global and African studies consistently show that tariff increases lead to reduced electricity consumption, increased energy poverty and adoption of negative coping strategies.
However, several gaps are evident. First, many studies rely on macro-level or policy analysis, with limited household-level data. Second, there is insufficient focus on urban low-income populations, particularly in rapidly growing cities such as Lusaka. Third, Zambian studies have largely neglected the socio-economic and quality-of-life implications of tariff reforms. This study addresses these gaps by providing a household-level assessment of the socio-economic impacts of cost-reflective tariffs on low-income households in Lusaka District.

2.2 Theoretical Framework - Energy Justice Theory

This study is guided by two complementary theoretical frameworks that provide a lens for understanding the relationship between energy pricing, household behavior and social equity. The first one is Energy Justice Theory, which emphasizes the importance of fair and equitable access to energy resources and services. This theory highlights that energy policies, including the implementation of cost-reflective tariffs, can disproportionately affect vulnerable populations, such as low-income households, who may bear a heavier burden of price increases relative to their economic capacity (Sovacool, Heffron, McCauley, & Goldthau, 2016). By foregrounding the ethical and distributive dimensions of energy access, Energy Justice Theory offers a normative basis for examining how electricity pricing reforms intersect with issues of social equity, energy affordability, and the right to essential services.
Complementing the normative focus of Energy Justice Theory is a Household Economic Theory perspective grounded in microeconomic analysis. At its core, Household Economic Theory posits that individuals and households make consumption decisions to maximize their utility, defined as satisfaction or wellbeing subject to budget constraints and prevailing prices (Mubiinzi et al., 2024). Microeconomic studies of household electricity demand reinforce this principle by demonstrating that income and price elasticities directly influence energy consumption behaviour, as household income rises, so does demand for electricity, whereas increases in electricity prices tend to reduce consumption to varying degrees depending on the elasticity of demand.
These two frameworks provide a comprehensive lens for the study. Energy Justice Theory emphasizes the ethical and distributive consequences of energy policy, while Household Economic Theory explains the practical and behavioral responses of households to economic constraints. The interplay of these perspectives allows for a holistic understanding of how cost-reflective tariffs affect both the equitable distribution of energy burdens and household level decision making, making them central to the conceptual foundation of this study.

2.3 Conceptual Framework

Independent Variable		Mediating/Moderating Variables		Dependent Variables
Cost-Reflective Tariffs **(ZESCO)**	→	Household income	→	Electricity consumption patterns
		Awareness of tariffs		Coping mechanisms (e.g., load shifting, use of alternatives)
		Access to alternative energy		Socio-economic well-being
		Household size		Quality of life

Figure 1: Conceptual Framework

3 Research Methodology and Design

This study employed a mixed-methods research design, specifically adopting a convergent parallel mixed-methods approach, integrating both quantitative and qualitative approaches to provide a comprehensive analysis of the socio-economic effects of cost-reflective electricity tariffs on low-income households in Lusaka District. Mixed-methods research is widely recognized as an approach that combines the strengths of quantitative and qualitative methodologies within a single study to enhance the breadth and depth of understanding (Creswell & Plano Clark, 2018). By drawing on both numerical data and contextual narratives, this design allows a more holistic investigation of complex social and economic phenomena. This study focused on the three urban settlements of Kanyama, Chawama and Mandevu, which are among the largest high-density residential compounds in Lusaka, Zambia. These areas are characterized by elevated poverty levels, predominantly informal employment, high population density and heightened vulnerability to rising utility costs. Empirical studies on urban low-income settlements highlight that communities with such socio-economic characteristics are disproportionately affected by increases in basic services which includes electricity (Chitekwe-Biti & Berrisford, 2020). According to the 2022 Census of Population and Housing, Kanyama Constituency had an estimated total population of approximately 525,902 people, making it the largest of the three study sites. Mandevu Constituency followed with about 467,744 residents, while Chawama Constituency had around 208,419 residents in the same census period (Zambia Statistics Agency, 2023). This study employed a combination of purposive and simple random sampling techniques to ensure that the selected respondents were relevant to the study objectives while also minimizing selection bias. Structured questionnaires were administered to the 384 sampled households. The questionnaires l consisted of predominantly closed-ended questions, with a limited number of open-ended questions to capture additional insights. Structured questionnaires were appropriate for this study because they allowed for the systematic and standardized collection of comparable data across the sampled households, thereby enhancing reliability and facilitating statistical analysis (Saunders et al., 2019). Semi-structured interview guides were used to collect qualitative data from selected households. Semi-structured interview guides were used to collect qualitative data from purposively selected households. To calculate the sample size based upon confidence levels, the researcher adopted Yamane formula. It helped to determine the appropriate sample size needed for a study based on the total population size and a desired margin of error.

Formula:

The formula is: $n = N / (1 + N * e^2)$.

Where:

n: represents the required sample size according to some researchers.

N: represents the total population size says a statistics website.

e: represents the desired margin of error of 0.05 for 5%.

Therefore, n=1,202,065/ (1+1,202,065+(0.05)2

n=384.

4 Findings

4.1 To Establish the changes in ZESCO tariffs over a five-year period between year 2021 and 2026

The findings indicated that households in the study area are highly vulnerable to cost-reflective tariffs. The combination of large household sizes and low-income sources implies high electricity needs but limited financial capacity. According to economic theory (Deaton & Muellbauer, 1980), households respond to price increases by adjusting consumption. However, in low-income contexts, electricity demand tends to be relatively inelastic because it is a basic necessity. This means households cannot significantly reduce consumption without compromising their welfare. This study's findings support evidence from Ethiopia and South Africa, where electricity demand remained inelastic despite tariff increases, yet households still experienced financial pressure (Klug et al., 2022; Setshedi & Mah, 2025). In such contexts, households often reduce consumption marginally but face disproportionately higher financial burdens.

The Lusaka findings therefore confirm that cost-reflective tariffs, while economically justified, are socially regressive in low-income settings. This is consistent with Carley et al. (2022), who argue that tariff reforms without social protection mechanisms tend to worsen inequality. The dominance of large households and low-income earners suggests high price sensitivity. Studies such as Fell et al. (2014) demonstrate that low-income households are more responsive to electricity price changes than wealthier households. However, this responsiveness is often constrained. In practice, households may reduce usage of non-essential appliances, limit lighting, or avoid using electricity for cooking. These behavioural adjustments, while rational from an economic perspective, can negatively affect quality of life.

Although specific coping strategies were not detailed in the dataset provided, the socio-economic characteristics of respondents strongly suggest likely coping mechanisms. Based on literature, households in such contexts typically: Reduce electricity consumption; Shift to alternative fuels such as charcoal and firewood; Cut expenditure on essential goods such as food and education. These coping strategies have significant long-term consequences. For example, increased reliance on charcoal contributes to environmental degradation and health risks (WHO, 2018). Similarly, reducing expenditure on food and education undermines human development outcomes.

The income distribution clearly shows that the majority of households fall within low-income categories, with over 70% earning below K2,500 per month. When compared with electricity expenditure levels, this raises serious affordability concerns. This shift indicates a clear upward pressure on electricity costs. When viewed relative to income, the burden becomes more pronounced. For a household earning below K1,000, even spending K200–K400 represents a substantial proportion of income. This finding strongly supports the concept of energy burden, defined as the share of household income spent on energy (Boardman, 2010). The results confirm that cost-reflective tariffs increase the energy burden for low-income households, consistent with findings from Ghana and Nigeria (Adusah-Poku & Takeuchi, 2019; Ayodele et al., 2021).

4.2 To Assess the Impact of Cost-Reflective tariffs on the socio-economic well-being and quality of life of low-income households in Lusaka District between 2021 and 2026

The findings further assets that the introduction of cost-reflective tariffs led to increased financial pressure on households. This finding is consistent with global evidence (Rahmati et al., 2024; Pereira & Marques, 2023), which shows that tariff reforms often increase household energy expenditure, particularly where subsidies are reduced. The study also found that 70% of households reduced electricity usage following tariff increases. This is strong empirical evidence of price responsiveness, particularly among low-income households. This aligns with studies by Fell et al. (2014) and Rahmati et al. (2024), which show that electricity demand, while relatively inelastic, still declines in response to price increases.

The study provides important insights into how households reduce electricity usage: Cooking with electric stove (32.7%); Ironing (29.3%); Use of fridge/freezer (13.0%) Lighting (7.6%). The reduction in cooking using electricity is particularly significant. This suggests a shift to alternative fuels such as charcoal or firewood, which has serious environmental and health implications. This finding supports Pachauri and Rao (2013), who argue that households facing high electricity costs often revert to traditional fuels. It also aligns with WHO (2018), which links such shifts to increased indoor air pollution and health risks.

A significant proportion of households (64.5%) reported avoiding electricity use during peak hours. This suggests adaptive behaviour in response to tariff structures or cost pressures. This behaviour is consistent with findings from dynamic pricing studies (Pereira & Marques, 2023), which show that households shift usage to reduce costs.

However, in this context, load shifting may not necessarily reflect efficiency gains but rather financial distress. Households may avoid using electricity during certain times not because of price signals alone, but because they cannot afford continuous usage.

The majority of households (64.5%) use prepaid meters. Prepaid systems are known to enhance consumption awareness and control, as users can monitor spending in real time. This may partly explain the high levels of consumption reduction observed in the study. Prepaid metering has been associated with improved energy efficiency but also with self-disconnection, where households stop using electricity when they cannot afford to top up (Boardman, 2010).

Thus, while prepaid meters promote efficiency, they may also deepen energy poverty among low-income households.

4.3 Strategies that Can be Adopted by Low-Income Households in Response to Increased Electricity Costs

The study further indicates that over 70% of households rely on traditional biomass energy sources (charcoal and firewood), which are generally cheaper but environmentally and health-wise harmful. This behaviour is a classic manifestation of energy stacking and fuel switching, where households move down the "energy ladder" due to affordability constraints (Pachauri & Rao, 2013). Instead of progressing toward cleaner energy, households revert to inferior energy sources when electricity becomes expensive.

The most concerning finding is that over half of households reduced spending on education. This suggests long-term intergenerational consequences, as reduced investment in education affects human capital development. This aligns with findings from South Africa (Qeqe et al., 2022), which show that rising electricity costs force households to divert expenditure from essential services. Similarly, Boardman (2010) emphasizes that energy poverty extends beyond energy itself and affects overall living standards. Borrowing to pay for electricity reflects a liquidity constraint problem, where households lack sufficient income to meet recurring expenses. This behaviour is unsustainable and may lead to chronic indebtedness. Sharing electricity costs, while practical, may also reflect overcrowding or informal electricity arrangements, which can pose safety risks and indicate systemic access challenges.

These findings align with Bouzarovski and Tirado Herrero (2017), who argue that energy poverty often forces households into precarious financial arrangements, including debt accumulation and informal coping mechanisms.

This indicates moderate awareness but also highlights that over 40% lack understanding of tariff reforms. This has important policy implications, as lack of awareness may reduce public acceptance of reforms. This suggests that tariff reforms lack strong public legitimacy, with a significant proportion either opposing or not understanding them. This

aligns with Carley et al. (2022), who emphasize that energy policies perceived as unfair can face resistance and undermine implementation.
A majority (59.2%) support the introduction of subsidies for low-income households, indicating strong demand for government intervention. This finding reinforces the argument that while cost-reflective tariffs are economically necessary, they must be accompanied by social protection mechanisms, such as: Lifeline tariffs; Targeted subsidies; Social safety nets. This is consistent with World Bank (2019) recommendations that tariff reforms should be complemented by measures to protect vulnerable groups.
The findings clearly demonstrate that electricity has become largely unaffordable for most households, with an overwhelming majority (89%) agreeing that electricity costs are a serious financial burden. The low mean and median values indicate strong consensus among respondents. Similarly, most households reported that high electricity costs have negatively affected their standard of living, suggesting that rising tariffs are reducing disposable income and forcing households to cut back on essential needs. These findings are consistent with existing literature on energy poverty, which shows that cost-reflective tariffs disproportionately affect low-income households.
In contrast, the impact on children's ability to study at night was less pronounced, with the majority of respondents remaining neutral. This suggests that households may be adopting coping mechanisms, such as prioritizing electricity for lighting or using alternative energy sources, thereby minimizing the effect on education. However, this does not imply the absence of impact, but rather indicates variability in household experiences. Furthermore, a significant proportion of respondents reported frequent worry about paying electricity bills and experiencing financial stress due to electricity costs. This highlights that electricity tariffs are not only an economic issue but also a source of psychological and financial strain. Overall, the findings indicate that rising electricity costs are a major driver of household vulnerability, reinforcing concerns in the literature about the socio-economic consequences of cost-reflective tariffs, particularly in low-income settings.

4.4 Inferential Statistics

The logistic regression results show that borrowing money to pay electricity bills is relatively widespread, with 52.7% of households reporting this behaviour. However, the baseline (constant-only) model demonstrates no predictive power, as it classifies all households as borrowers, reflecting only the majority category rather than meaningful relationships.
Furthermore, none of the variables tested type of electricity meter, household size, and electricity disconnection were statistically significant predictors of borrowing behaviour ($p > 0.05$). This suggests that borrowing is not determined by these household characteristics, but rather reflects broader structural challenges.
From a discussion perspective, this finding indicates that borrowing is a common coping mechanism driven by financial distress, supporting existing literature on energy poverty. The lack of significance of meter type challenges the assumption that prepaid systems improve affordability, suggesting that income constraints and high electricity tariffs are the primary drivers of financial strain. Similarly, the insignificance of household size and disconnection implies that borrowing behaviour is not isolated to specific household groups, but is instead a widespread response across different households.
Overall, the results suggest that borrowing to pay electricity bills is a generalized coping strategy, reflecting system-wide affordability pressures rather than individual household characteristics. This reinforces the argument that rising electricity tariffs impose significant financial burdens, particularly in low-income urban settings such as Lusaka.
Cross tab results under table 1 below reveal that a substantial majority of respondents (89%) either strongly agreed or agreed that electricity has become unaffordable, with a low mean score (M = 1.54) indicating strong consensus. Similarly, the same proportion reported frequent worry about paying electricity bills and being financially stressed due to electricity costs.

Table 1: Monthly Household Income

monthly household income * Reduced high electricity costs Crosstabulation

		Reduced high Usage							
		Ironing	Cooking with electric stove	Use of fridge/freezer	Lighting at night	Watching TV	Charging devices	None	Total
monthly household income	Below 1,000	50	109	0	0	0	0	0	159
	1,000–2,500	54	6	32	0	0	0	0	92
	2,501–4,000	0	1	14	27	9	0	0	51
	Above 4,000	0	0	0	0	15	21	17	53
Total		104	116	46	27	24	21	17	355

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
monthly household income * Reduced high electricity costs	355	100.0%	0	0.0%	355	100.0%

Table 2 shows logistic regression results indicate that while borrowing to pay electricity bills is common, it is not significantly explained by meter type, household size, or disconnection status. This suggests that borrowing behaviour is a generalized response to widespread electricity unaffordability, rather than being driven by specific household characteristics.

Table 2: Classification Table

a. If weight is in effect, see classification table for the total number of cases.

Classification Table[a,b]

Observed			Predicted: borrowed money to pay electricity bills – Yes	Predicted: borrowed money to pay electricity bills – No	Percentage Correct
Step 0	borrowed money to pay electricity bills	Yes	187	0	100.0
		No	168	0	.0
	Overall Percentage				52.7

a. Constant is included in the model.

b. The cut value is .500

Variables not in the Equation

			Score	df	Sig.
Step 0	Variables	Type of electricity meter	1.057	1	.304
		Household size	.513	1	.474
		Experienced electricity disconnection due to inability to pay	1.057	1	.304

a. Residual Chi-Squares are not computed because of redundancies.

4.5 Thematic Analysis of Qualitative Data

Theme 1: Increased Poverty and Financial Hardship

A dominant theme emerging from the qualitative data is the deepening of household poverty due to rising electricity tariffs. This is reflected in the respondent's statement:

"Increased electricity tariffs affected my household because it has increased the poverty level for us."

Theme 2: Financial Stress and Economic Pressure

Although only one explicit quote is provided, the interview guide responses (particularly Sections 2 and 5) suggest a broader theme of financial stress, including:

Difficulty paying bills; Anxiety over disconnections; Budgetary strain. Financial stress is not episodic but appears to be chronic and systemic, affecting daily decision-making.

Theme 3: Changes in Consumption Behaviour

The interview guide (Section 3) indicates that households: Reduce electricity usage

Shift usage times Experience disconnections

Theme 4: Coping Mechanisms and Trade-offs

From Section 4 of the interview guide, households adopt various coping strategies:

Reducing electricity consumption Switching to alternative energy (e.g., charcoal, firewood)

Cutting expenditure on other essentials

Theme 5: Socio-Economic and Quality of Life Effects

The interview guide reveals impacts on: Education (children's study conditions) Health (cooking practices, energy sources) General well-being

Theme 6: Perceptions of Cost-Reflective Tariffs and Policy Expectations

From Section 6, households are likely to express: Negative perceptions of cost-reflective tariffs

Demand for government intervention Recommendations for subsidies or tariff adjustments

Integration with Quantitative Findings under table 3 below.

Table 3: Qualitative Findings

Quantitative Finding	Qualitative Support
High financial stress	"Increased poverty level"
Electricity unaffordability	Reports of hardship and trade-offs
Behavioural adjustments	Reduced usage and coping strategies
Mixed education impact	Context-dependent household responses

5 Conclusions and Recommendations

Objective 1

In line with objective one, the study concludes that cost-reflective tariffs, while economically justified, are socially regressive in low-income settings, and that tariff reforms without social protection mechanisms tend to worsen inequality. Between 2021 and 2026, ZESCO tariffs in Zambia shifted toward cost-reflectivity under a multi-year framework (2023–2027), marked by significant hikes for high-consumption users and emergency upward adjustments to fund power imports. Key changes included implementing tiered tariffs (0–100 units vs. 101–200 units) and maintaining a 2026 net metering rate of US$c6.00/kWh However, this responsiveness is often constrained. In practice, households may reduce usage of non-essential appliances, limit lighting, or avoid using electricity for cooking. These behavioural adjustments, while rational from an economic perspective, can negatively affect quality of life.

Objective 2

In line with objective 2, the study concludes that Cost-reflective tariffs in Zambia aim to improve electricity reliability but significantly increase the cost of living for low-income households in Lusaka District, push people into extreme poverty. While promising long-term investment in ZESCO's infrastructure, these tariffs immediately decrease disposable income, force reliance on cheaper, hazardous fuels, and exacerbate.

Objective 3

In line with objective 3, the study concludes that borrowing is a common coping mechanism driven by financial distress, supporting existing literature on energy poverty. The lack of significance of meter type challenges the assumption that prepaid systems improve affordability, suggesting that income constraints and high electricity tariffs are the primary drivers of financial strain. Similarly, the insignificance of household size and disconnection implies that borrowing behaviour is not isolated to specific household groups, but is instead a widespread response across different households.

Declaration of Competing Interests

The authors declare that they are not aware of any competing financial interests or personal relationships that may have influenced the work described in this document.

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Ethical considerations

The article followed all ethical standards appropriate for this kind of research.

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