Powering Well-Being: Untangling the Nexus of Energy Poverty, Quality of Life and Sustainable Development in Owerri, Imo State Nigeria

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ABSTRACT

This study explores the interconnections between energy poverty, quality of life, and sustainable development in Owerri, Imo State, Nigeria. Despite Nigeria's status as Africa's largest economy and a significant oil producer, energy poverty remains a critical challenge that affects socio-economic progress. Using qualitative methods, we collected data from business operators and households across urban and rural parts of the state capital to investigate energy supply patterns, the energy-dependent informal sector, and the impacts of energy poverty on well-being. Findings indicate that 60% of respondents rely on generators as their primary energy source, followed by solar energy (25%) and PHCN/NEPA (10%). This heavy dependence on costly and environmentally harmful alternatives highlights systemic access challenges. Energy poverty significantly affects household income, perpetuates cycles of poverty, alters consumption patterns, impedes business growth, and contributes to emotional distress. We recommend diversifying energy investments, improving infrastructure, strengthening public–private partnerships, increasing funding for energy research, and implementing effective energy pricing policies to address these challenges and support sustainable development in Owerri.

Keywords: Well-being, Energy poverty, Quality of life, Sustainable development, Owerri, Nigeria

INTRODUCTION

Energy is a cornerstone of modern economies, driving industrial productivity, technological innovation, and human welfare (Wang et al., 2021). Developed nations such as Germany, the United States, and China exemplify how reliable energy access underpins economic growth and enhances quality of life (Owebor et al., 2021). The lack of affordable, reliable, and sustainable energy is, however, a critical barrier to socio-economic progress, particularly in sub-Saharan Africa (Andersen & Dalgaard, 2013; Cole et al., 2018). Paradoxically, energy poverty remains a significant challenge in Nigeria, Africa's largest economy and a major oil producer, with over 60% of the population lacking access to stable electricity (Okoye et al., 2022). Recent global tracking shows over 86 million Nigerians, the most significant access deficit worldwide, were without access to electricity in 2022 (Adeshina, M. A., Ogunleye, A. M., Suleiman, H. O., Yakub, A. O., Same, N. N., Suleiman, Z. A., & Huh, n.d.). This underscores how resource wealth has not translated into broad-based infrastructure and service delivery. This paradox is often framed as a "resource curse": a situation in which abundant natural resources can not translate into development and improved quality of life (Mateo-Peinado, 2022; Porteous, 2022).

In Nigeria, energy poverty perpetuates cycles of underdevelopment, thereby lowering the productivity, healthcare, education, and infrastructure development of the nation (Nriagu, 2019; Tumala et al., 2022). Imo State, one of the states in the country, represents this crisis of acute energy shortages despite being part of the country's oil-rich Niger Delta Region. In response, households and firms lean heavily on private generation, and around 40% of electricity consumed nationally is estimated to come from back-up generators (Elinwa et al., 2020). This comes with substantial economic and environmental costs. The reliance on costly and environmentally harmful alternatives, such as generators, highlights the systemic failures in energy infrastructure and policy (Osumgborogwu et al., 2017). This energy deficit also worsens the poverty index as many households and businesses grapple with high operational costs, health risks from pollution, and reduced productivity (UNICEF, 2020). In addition, economic diversification is limited, and quality of life is subsequently degraded.

Geopolitical dynamics and institutional weaknesses further complicate energy poverty in Imo State. Despite Nigeria's Renewable Energy Master Plan (REMP), which aims to increase renewable energy adoption to 10% by 2025, progress remains sluggish (REMP, 2011), while illegal, crude oil refining has become a makeshift energy source for marginalised communities. Also, the frustration over environmental degradation and resource inequity deepens ecological and health crises (Osumgborogwu et al., 2017). These challenges highlight the urgent need to address energy poverty as a prerequisite for achieving Sustainable Development Goals (SDGs) 1 (No Poverty) and 7 (Affordable and Clean Energy). This study investigates the nexus of energy poverty, quality of life, and sustainable development in Imo State, Nigeria by mapping out the spatial distribution of energy poverty across Imo State; analyzing how energy scarcity impacts quality of life indicators (e.g., health, income, economic activity), and identifying actionable policy solutions to improve energy access and align with SDG targets. This research aims to bridge theoretical insights with practical strategies for sustainable development.

LITERATURE REVIEW

Access to energy is a cornerstone of modern life, influencing economic growth, health, education, and well-being. The United Nations' Sustainable Development Goal 7 (SDG 7) emphasises universal access to affordable, reliable, and sustainable energy by 2030 (Leal Filho et al., 2023). Despite this, energy poverty persists, particularly in developing countries, where millions lack electricity and clean cooking solutions. This disparity worsens cycles of poverty and affects the progress toward global sustainability targets.

Nigeria typifies this crisis, with significant portions of its population lacking access to modern energy services (Monyei et al., 2018; Nduka, 2021). Energy poverty in Nigeria is defined by inadequate access to electricity, reliance on traditional biomass, and socioeconomic barriers such as high energy costs and poor infrastructure (Ayodele & Ogunjuyigbe, 2015; Nduka, 2021). Households unable to afford modern energy systems often resort to biomass fuels, which have attendant health risks and other negative consequences such as deforestation (Ayodele & Ogunjuyigbe, 2015). In fact, the situation can be defined as multidimensional and includes a mix of income inequality, governance gaps, and environmental degradation.

Literature has identified systemic causes of energy poverty, including weak regulatory frameworks, insufficient infrastructure investment, and limited financing for renewable energy projects (Costa et al., 2023; Esily et al., 2023; Hosan et al., 2023; Xiao et al., 2023). Studies also highlight policy fragmentation and governance inefficiencies that hinder equitable energy distribution (Esily et al., 2023). In Nigeria, these issues are complicated by rural-urban disparities. Rural communities like those in Imo State are disproportionately affected due to underdeveloped grid networks and institutional neglect.

In addition to rural electrification deficits and reliance on unsustainable biomass fuels, systemic barriers include high costs of clean technologies, inadequate distribution networks and limited financing. Socio-cultural preferences for traditional fuels driven by familiarity and affordability reinforce dependency, while awareness gaps leave households uninformed about cleaner energy options (Chidiebere-Mark & Adikibe, 2025).

Ewurum and Ojiako (2022) carried out a geospatial mapping of electricity distribution in Owerri Municipal, and the findings reflect the poor coverage due to ageing infrastructure and inefficient transmission/distribution systems that result from low voltage, unauthorised connections, corruption, equipment vandalism, and poor spatial planning. Geospatial analysis revealed 26,350 distribution assets, including 2,507 high-tension lines, 8,536 low-tension lines, 11,502 poles, 505 transformers, and 59 solar systems. Infrastructure distribution was reported as uneven, with Umueche community having the highest population and transformer density, while industrial zones (Arugo Layout, Onitsha Road) and Ikenegbu Layout concentrate 20–25+ transformers each.

Energy poverty exacerbates inequalities in health, education, gender, and economic opportunity. Indoor air pollution from biomass use contributes to respiratory illnesses, disproportionately affecting women and children

(Banerjee et al., 2021; Niu et al., 2023). In education, limited electricity access impedes study time for students, lowering academic performance (Niu et al., 2023). Gender dimensions are stark: women and girls, often tasked with collecting firewood, face poverty, reduced educational access, and safety risks (Abbas et al., 2021; Nguyen & Su, 2021). Economically, energy poverty stifles small businesses, limiting income generation and sustainable development (Xiao et al., 2023).

Energy poverty in developing countries can also be conceptualised through the lens of the capability theory. The theory represents a profound deprivation of the real opportunities (capabilities) individuals have to achieve essential "beings and doings" (functionings) such as maintaining health, accessing education, engaging in economic activities, and participating in social life. The capability theory, rooted in Amartya Sen and Martha Nussbaum's framework, shifts focus from mere energy access to the systemic barriers that prevent people from converting energy resources into meaningful life outcomes (Day, Walker & Simcock, 2016).

Chidiebere-Mark et al.'s (2018) study shows that among farming households in Owerri Agricultural Zone, traditional, harmful energy sources were dominant for cooking, with 70.83% of farming households relying on fuel wood, 23.61% on kerosene, and only 5.56% using cleaner liquefied petroleum gas (LPG). Monthly consumption data revealed households burn an average of 21.2 bundles of fuel wood compared to 6.25kg of LPG.

Also, on the choice of cooking and lighting fuel in Imo State, Chidiebere-Mark and Adikibe (2025) reported that 77% of rural households use firewood, charcoal, or kerosene for cooking, indicating heavy reliance on biofuels. Also, 52% relied on these sources for lighting, highlighting limited access to clean energy alternatives. The study also explained that income levels significantly influence this crisis, as cost barriers prevent low-income families from adopting cleaner options like LPG or solar systems. Other factors that seemed to play some role in the choice of energy source were educational attainment and participation in community groups.

While existing literature addresses national and regional energy poverty trends, there is a paucity of investigation relating to the spatial patterning of electricity deficits and their concrete effects on everyday well-being in Owerri, Imo State, Nigeria. Building on these gaps, this study is guided by two questions:

How uneven is electricity access and reliability across urban neighbourhoods in Imo State, and who bears the highest costs of unreliability? (spatial and socio-economic patterns)

How do electricity shortfalls affect core quality-of-life indicators such as household income, study time/education, business operations, and health? This gap highlights the critical need for localised, context-specific research to guide the development of targeted policies aligned with SDG 7 (Adekanbi, Ibukun & Steve, 2021).

MATERIALS AND METHODS

Study area

Imo State is located in southeastern Nigeria, covering approximately 5,100 km². The area lies between latitudes 4°45′N–7°15′N and longitudes 6°50′E–7°25′E. Abia State borders it **to the** east, Anambra State to the north, Rivers State to the south, and the River Niger/Delta State to the west. Owerri, the capital and largest city of Imo State, is the focal area for this study.

Owerri is the most densely populated urban centre in Imo State with over 230–1,400 persons/km². The area is also associated with rapid peri-urban growth, creating concentrated electricity demand and expanding load centres. The local economy, dominated by commerce and small enterprises, is susceptible to power reliability, making generator reliance common during grid shortfalls. Climate is strongly seasonal: a rainy season (April–October, ≈1,500–2,200 mm) and a dry season with Harmattan (late December–February)**,** with the hottest months in January–March. Heavy rains, erosion, and fragile road infrastructure frequently disrupt distribution assets and access routes, compounding technical losses and outage frequency. These conditions make Owerri an appropriate testbed for analysing electricity access, reliability, generator dependence, and their implications for well-being.

Study Design

The study adopted a cross-sectional, mixed-methods design to examine links between energy access, well-being, and sustainable development in Owerri, Imo State. Quantitative data were collected through a structured questionnaire administered to residents and business operators; qualitative insights were obtained from key-informant interviews and observational transects used to create a simple spatial profile of power supply across neighbourhoods. The design aligns with the results reported—descriptive statistics on energy sources, informal-sector dependence, quality-of-life effects, and a map of uneven electricity supply—by collecting data in the exact domains.

Population and Sampling

The target population comprised adult residents and business operators in Owerri metropolis (municipal wards and peri-urban fringes). A multistage approach was used: (i) wards were selected to capture central, planned estates and peripheral, fast-growing areas; (ii) within wards, high-footfall locations (markets, arterials, estates, industrial corridors) were identified; (iii) systematic intercept sampling (every 3rd–5th passer-by/eligible operator) was employed at each location.

Sample Size Determination

A minimum sample of 384 respondents was required at 95% confidence and ±5% precision (Cochran's formula for proportions with $p=0.5$). To improve ward-level coverage and accommodate non-response, the target was rounded up to 400. This final sample size ($n=400$) matches the results presented in the tables and figures.

Eligibility and Recruitment

Eligible participants were ≥18 years and resident or operating a business within the study wards for ≥6 months. Visitors and respondents unwilling to provide consent were excluded. Recruitment was conducted in daylight hours (08:30–16:00) over five field days.

Instruments and Measurement

Questionnaire (paper-based): sections covered (A) demographics (age, sex, education, occupation), (B) household/enterprise energy sources with single-choice ticking (Generator, Solar, PHCN/NEPA, Other), (C) informal-sector dependence on electricity (Artisans, Bars/Restaurants, Beauticians, Food vending, Supermarkets, Fashion designing, Wine/Ice block, Others), and (D) perceived effects of energy poverty on quality of life (household income stability, business performance, emotional discomfort, health impacts), using a checklist that aligns with the reported counts in Figure 1.

Key-informant interviews: brief semi-structured guides for utility/market actors and community representatives were used to contextualise grid reliability, transformer status, load management, and coping practices.

Spatial observation sheet: field teams recorded typical daily supply bands by neighbourhood using an observation checklist and transect walks (Very Low 0–5 h/day; Low 5–8 h/day; High 8–11 h/day; Very High 11–18 h/day). These categories underpin the spatial summary reported in Figure 2.

Data Collection Procedures

Trained research assistants administered questionnaires face-to-face, after verbal consent, at preselected sites. Businesses were approached during operating hours; households were engaged in public spaces to avoid disrupting private premises. For each ward, observation points were logged and assigned to an hourly sweep to record supply bands and notable infrastructure issues (e.g., overloaded/aged transformers, feeder faults).

Completed forms were checked on-site for completeness and filed in ward-labelled envelopes. A daily tally sheet tracked completions, partials, and refusals to ensure the final count reached n=400.

Data Analysis

Data were double-entered into a spreadsheet and cross-checked (10% back-check). Descriptive statistics generated the distributions reported in the Results (e.g., Generator 60%, Solar 25%, PHCN/NEPA 10%, other 5%; sectoral dependence percentages). Demographic summaries were produced for age, education, and occupation. Perceived effects on quality of life were tabulated as frequencies/percentages (income instability, emotional discomfort, business stagnation, health impacts). Spatial observations were summarised by neighbourhood into the four supply bands to produce the citywide profile.

Quality Assurance

Enumerators received a half-day training on questionnaire administration and neutrality; supervisors performed spot checks and same-day form reviews. Classification rules (e.g., supply bands) were printed on cue cards to ensure consistent observation. Any ambiguous responses were clarified immediately with respondents.

Ethical Considerations

The study upheld voluntary participation, anonymity (no personal identifiers), and the right to withdraw at any time. Only infrastructure (not people) was photographed during transects. Approvals were obtained from the host institution, and community gatekeepers were informed before fieldwork.

SUMMARY OF FINDINGS

Table 1: Demographic Profile of Respondents

Characteristics	Frequency	Percentage (%)
15-19	100	25
20-24	62	15.5
25-29	48	12
30-34	50	12.5
35-39	63	15.75
Above 40	77	19.25
Total	400	100
Educational	**Frequency**	**Percentage (%)**
Non - formal	95	23.75
FSLC	104	26.00
SSCE	130	32.5
B.Sc.	53	13.25
Post-graduate degree	18	4.50
Total	400	100

Occupation	Frequency	Percentage (%)
Trader	150	37.50
Unemployed	75	18.75
Civil servant	50	12.5
Student	60	15
Others	65	16.25
Total	**400**	**100**

Source: Field survey, 2025

Table 1 outlines the demographic profile of the 400 selected respondents in Owerri, revealing an economically active population and a firm reliance on informal livelihoods. As tabulated, the sample is predominantly young (40.5% aged 15–24) but includes a sizeable ≥40 cohort (19.25%). With regards to Education, there is a cluster of respondents with SSCE at 32.5% and basic schooling (FSLC 26.0%), with relatively few holding tertiary credentials (B.Sc. 13.25%; Postgraduate 4.50%). Occupations are dominated by traders (37.5%), alongside students (15.0%) and civil servants (12.5%), with unemployment at 18.75%. This combination of a young population and a strong informal sector helps explain heightened exposure to electricity unreliability and the associated income sensitivity noted in the study. This assertion corroborates the findings of Monyei et al. (2018) and Nduka (2021) in their various investigations on energy poverty. This combination of a young population and a strong informal sector helps explain heightened exposure to electricity unreliability and the associated income sensitivity noted in the study. Table 2. Below presents the forms of energy supply and consumption ratings.

Table 2: Forms of Energy Supply and Consumption Rating

Options	Frequency	Percentage (%)
Generator	240	60
Solar	100	25
PHCN (NEPA)	40	10
Others	20	5
Total	**400**	**100**

Source: Field Survey, 2025

The findings reveal a heavy reliance on generators (60%, 240 respondents), followed by solar energy (25%, 100 respondents), PHCN (NEPA) (10%, 40 respondents), and other sources (5%, 20 respondents).

Table 3: Informal Sector dependence on Energy Sector

Options	Frequency	Percentage (%)
Artisans	104	26
Bar and restaurants	50	12.5
Beautician	40	10

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Food vending	40	10
Supermarket	41	10
Fashion designing	40	10
Wine shops/Ice block	30	7.5
Others	55	13.75
Total	**400**	**100**

Source: Field survey, 2025

The informal sector in Owerri shows significant energy dependence, with artisans (26%) being the most reliant, and bars/restaurants (12.5%) following up. These sectors depend heavily on electricity for machinery, refrigeration, and daily operations. At the lower end, wine/ice block retailers (7.5%) face the least energy dependency. There are evident disparities in energy needs across informal sub-sectors.

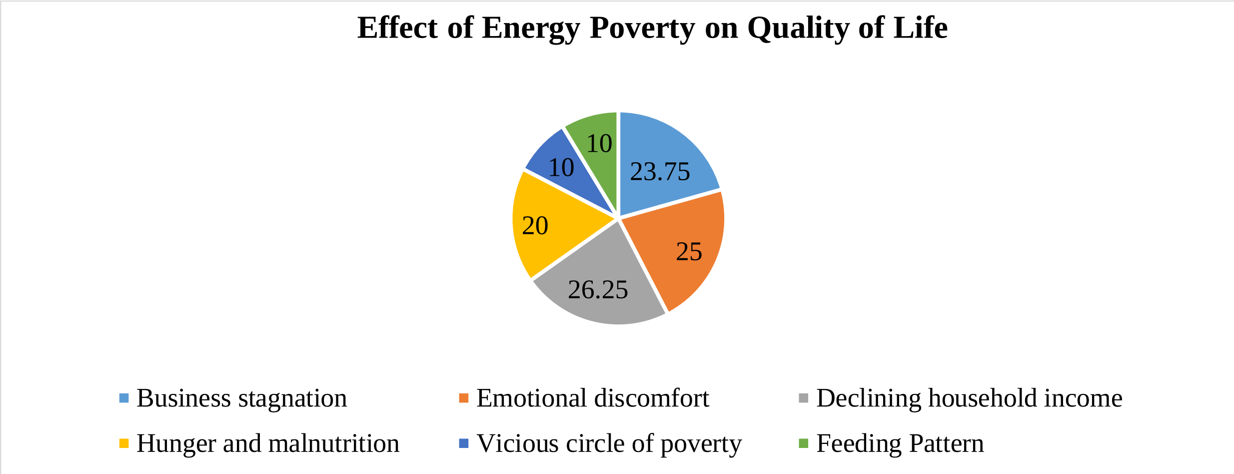

Figure 1: Effect of Energy Poverty on Quality of Life

Source: Field survey, 2025

Based on the findings of the study, three effects stand out most. This includes destabilisation of household income stability (26.25%), emotional discomfort (25%), and business stagnation due to unreliable energy access (23.75%). Furthermore, health-related impacts were also significant, 80 (20%).

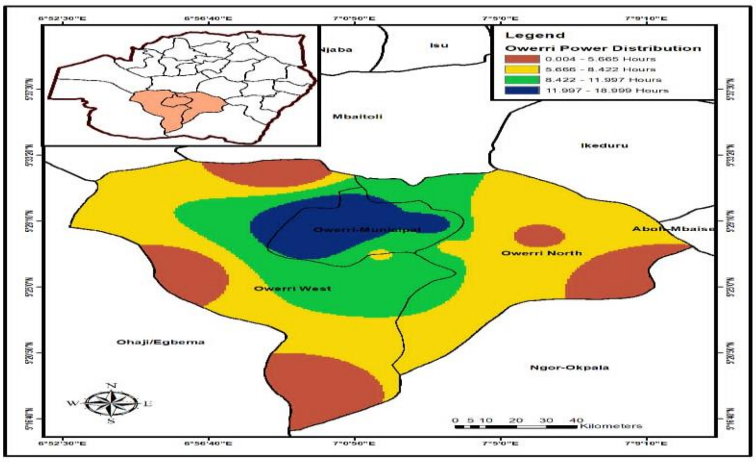

Figure 2: Spatial Distribution of Power Supply in Owerri, the capital city

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Source: Author’s Fieldwork (2025)

Owerri, the capital of Imo State in southeastern Nigeria, is an urban hub with increasing residential, commercial, and governmental activities. However, the city experiences irregular and uneven power supply across its neighbourhoods.

Summary of Power Supply in Owerri Capital City

 Very Low Supply Areas (0–5 hours/day)

Nekede and Akwakuma

These areas are at the urban fringe or fast-developing zones with poor grid coverage, outdated infrastructure, and low transformer capacity.

- Low Supply Areas (5–8 hours/day)

Douglas Road (Central Business District)

Orji, Egbu Road, and Amakohia

Mostly medium-density areas with high demand and frequent load shedding. Supply is inconsistent and prone to outages.

- High Supply Areas (8–11 hours/day)

World Bank Housing Estate, Ikenegbu Layout

Residential areas with relatively planned electricity infrastructure. These zones enjoy better grid connection and moderate supply consistency.

 Very High Supply Areas (11–18 hours/day)

Aladinma Housing Estate and New Owerri

High-income or government-reserved areas with strong energy infrastructure, newer transformers, and prioritisation in distribution.

Spatial Disparity: Central and high-income areas (e.g., Aladinma, New Owerri) enjoy very high-power supply, while peripheral zones (e.g., Akwakuma, Nekede) fall into the very low category.

Grid Limitations: Old transformers, poor maintenance, and overloading are major contributors to disparities.

Reliance on Alternatives: In low and very-low-supply areas, households rely heavily on generators, solar systems, and inverters.

Policy Gap: Lack of targeted infrastructure investment in growing suburbs.

Table 4: Measures for strengthening Energy Supply

Measures	Frequency	Percentage (%)
Diversified energy investment	102	25.50
Adequate energy Infrastructure	32	8

Public-private energy partnership	90	22.50
Well-funded energy research	91	22.75
Energy Pricing Regulation	85	21.25
Total	400	100

Source: Field Survey, 2025

The respondents' reactions to sustainable measures to contain energy poverty are indicated in their responses as follows: the highest-rated measure was diversified energy investment (25.50%, 102 respondents), followed by need for well-funded energy research (22.75%, 91 respondents) and public-private energy partnerships (22.50%, 90 respondents). Energy pricing regulation (21.25%, 85 respondents) received a significant mention. The least prioritised measure was adequate energy infrastructure (8%, 32 respondents).

DISCUSSION OF FINDINGS

The study attempted to identify the forms of energy supplied and consumed in Owerri; examine the characteristics of the informal sector reliant on energy access; assess the impact of energy poverty on quality of life and well-being; analyse the spatial distribution of power supply across Owerri; and finally, propose measures to address energy poverty within the state capital.

From the findings, as shown in Table 1, during interview sessions with business operators in the study area, it was identified that the consumption pattern of energy varied due to the availability of various forms of energy supply. Consumption rating for generators was 240 (60%), solar energy consumption was 100 (25%), PHCN (NEPA) was 40 (10%), and other forms of energy were 20%. By implication, the highest number of business operators in the study area relied on generators to source energy. Considering the cost of fuel and the global warming effect, over-reliance on generators in business operations is economically unfavourable and environmentally unfriendly. Solar energy, though used by a quarter of the sample (25%), remains underutilised compared to generators, suggesting limited access to renewable infrastructure or affordability challenges. PHCN (NEPA), the national grid provider, serves only 10% of respondents, reflecting unreliable public energy distribution in the region. Other sources (e.g., inverters, biomass) account for 5%, highlighting niche or transitional energy practices. This is in line with Ogbu et al. (2025), who decried the poor quality of electricity power supply and high dependence on diesel generators in Owerri. This distribution reveals high energy poverty in Owerri, where economic constraints, grid inadequacies, and environmental trade-offs shape energy choices.

Table 2 reflects the nature of sectors in the study area that are dependent on the energy sector. The highest proportion of respondents, 104 artisans (26%), noted that their businesses rely entirely on energy access for success. Similarly, 85 wine/ice block merchants (21.25%) emphasised that power supply failures could lead to business collapse. A further 55 respondents (13.75%) cited other occupations tied to energy dependency. Commercial sectors such as bars and restaurants (50 respondents, 12.5%) and food vending outlets (40 respondents, 10%) also highlighted energy reliance for operations. Additionally, 41 supermarket owners (7.5%) and 40 beauticians (10%) stressed the importance of a consistent energy supply for their businesses. Finally, 40 fashion designers (10%) identified power availability as a critical advantage for their work. From the data, it can be inferred that the poor state of energy supply or disruptions in power supply will likely destabilise livelihoods and local economic activity across the board (Adekanbi et al., 2021). A good power supply is required for diversified economic activity in Owerri.

Analysis of the findings on the effect of the energy crisis on the quality of life is shown in Figure 1. It reveals the broad nature of the consequences of energy poverty in Owerri. The most frequently cited impact was the destabilisation of household income stability, reported by 105 respondents (26.25%), who emphasised that inconsistent energy supply undermines economic security. A close second was emotional discomfort due to recurrent power outages, reported by 100 respondents (25%). Additionally, 95 respondents (23.75%) attributed business stagnation to unreliable energy access. Health-related impacts were also significant: 80 individuals

(20%) linked energy supply failures to localised hunger and malnutrition. Forty respondents (10%) noted that energy fluctuations necessitated alterations in dietary habits, increasing risks of malnutrition and diminished well-being, while another 40 respondents (10%) explicitly connected energy poverty to the perpetuation of a systemic cycle of deprivation. This aligns with Day et al. (2016), whose reflections emphasise the multidimensional nature of the energy crisis.

Figure 2 reflects the pattern of electric supply as follows: The spatial distribution of power supply in Owerri, Imo State, reveals a clear pattern of uneven access linked to socioeconomic conditions and infrastructure gaps. High-income areas like Aladinma Housing Estate and New Owerri receive 11–18 hours/day of electricity due to modern infrastructure, newer transformers, and prioritised distribution. In contrast, peripheral zones such as Nekede and Akwakuma get only 0–5 hours/day because of ageing equipment, poor maintenance, and insufficient grid coverage. Medium-density areas (e.g., Douglas Road) experience 5–8 hours/day of inconsistent supply due to high demand and load shedding, while planned estates like World Bank Housing Estate (8–11 hours/day) show moderate reliability. Structural issues, including overloaded transformers and outdated networks, drive these inequalities. In underserved areas, households increasingly depend on generators and solar systems to manage gaps. Addressing these challenges requires infrastructure upgrades in growing suburbs and decentralised energy solutions to improve access to equity. A similar study by Ewurum and Orjiako (2022) confirms the disparities and irregular spread in electrical power supply facilities in Owerri municipal.

The most frequently endorsed measures to address energy poverty in Owerri, were: 102 respondents (25.50%) advocating for diversified energy investment (e.g., solar, wind, decentralized systems); 91 respondents (22.75%) emphasizing the need for well-funded, locally tailored energy research to drive context-specific innovations; 90 respondents (22.50%) highlighting the importance of public-private energy partnerships or collaborative frameworks; 85 respondents (21.25%) prioritizing energy pricing regulation to address affordability concerns through strategies like subsidies or tiered pricing; and 32 respondents (8%) calling for adequate energy infrastructure upgrades. This indicates a strong preference for diversification, affordability, and innovation as key pathways to mitigating energy poverty.

CONCLUSION AND RECOMMENDATIONS

A clear socio-economic and spatial bias is shown in the uneven distribution of power supply within Owerri. High-income and planned estates enjoy more stable electricity compared to low-income or expanding areas. A focused energy policy and infrastructural upgrade are essential to achieve energy equity.

Since businesses and household chores cannot be effectively operated without an adequate energy supply, research on energy poverty has become essential in Nigeria as a whole. The problem of frequent power failures has affected many businesses. It has been responsible for the alarming rate of unemployment, youth restiveness, declining entrepreneurial potential, and the dwindling economic situation of Imo State and Nigeria, by extension. Given the circumstances, the following solutions are thus proffered:

1. Energy supply coverage should be expanded to underserved areas through regulated energy pricing and investment in energy infrastructure, particularly in communities with high energy poverty, such as Orji, Akwakuma, and Nekede. To promote equity in energy access, energy pricing should be subsidised for low-income earners, and policies should be introduced to ensure energy affordability for all, thereby bridging the energy gap.

2. The power infrastructure should be upgraded and expanded through improvements and growth of the existing power grid, replacement of ageing transformers in areas with low supply, routine maintenance of distribution lines and feeders, and the installation of new substations and transformers to support growing residential clusters.

3. Zonal load balancing should be implemented by adopting innovative load distribution systems that avoid overburdening central zones while underserving peripheral ones. It is recommended that the city adopt automated load management systems that prioritise stability in all zones.

4. Community-based or self-help energy solutions should be encouraged by ensuring the active participation of local community members in decision-making processes related to energy access and development. Furthermore, there should be an exploration of diverse energy options through dedicated research, advocacy, and strategic fund sourcing, all of which can be introduced to the communities with their active involvement.

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