

Impact of Rural Electrification on Poverty Reduction: Evidence from Gulu and Ebbo Communities in Lapai Local Government Area, Niger State.

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Abstract

Access to reliable electricity remains a central challenge to sustainable development in sub-Saharan Africa, where millions of rural households still depend on traditional energy sources. This study examines the impact of rural electrification on poverty reduction in Lapai Local Government Area of Niger State, Nigeria. Specifically, it compares welfare outcomes between Gulu community, which has benefited from electrification, and Ebbo community, which remains largely un-electrified. The study adopted a quantitative quasi-experimental design using the Propensity Score Matching (PSM) technique to control for selection bias and estimate the causal effect of electrification. Primary data were obtained from 300 households 120 from Gulu and 180 from Ebbo selected through a multi-stage sampling process. Descriptive statistics and logistic regression were used to estimate propensity scores, while nearest-neighbour matching (1:1, caliper 0.05) was employed to derive the Average Treatment Effect on the Treated (ATT). The results revealed that households in Gulu were 12 percentage points more likely to escape multidimensional poverty and had approximately 19.7% higher household income compared to similar households in Ebbo. Robustness checks using kernel, radius, and inverse probability weighting confirmed the stability of these results. The findings indicate that electrification significantly enhances household welfare and contributes to poverty reduction in rural areas. It is therefore recommended that government and development partners expand rural electrification projects and integrate them with complementary initiatives such as entrepreneurship support, microcredit access, and rural infrastructure development to maximize welfare gains.

Keywords: Rural electrification, Poverty reduction, Energy access, Sustainable development, Multidimensional poverty, Renewable energy

Introduction

Electricity is vital in enhancing economic development and the living standards of the urban and the rural populations. The availability of cheap and sustainable electricity is well known as a prime catalyst of development since it boosts productivity, industrial activities, increases education and delivery of healthcare systems and plays a key role in alleviating poverty. Rural electrification has become a key policy tool in ensuring inclusive growth and sustainable development in the developing countries. The International Energy Agency (2023) suggests that over 700 million individuals in the world have no access to electricity, with sub-Saharan Africa consisting of almost 80 percent of the total population. Although Nigeria has a strong energy potential, there is still a significant problem associated with the equitable access to electricity in the country, especially in the rural areas where poverty rates are still extremely high.

Rural electrification offers a platform on which social and economic changes can take place through the realization of new income streams, increased educational attainments, and better accessibility to social amenities. Electric societies are better placed to undertake productive

activities like agro-processing, refrigeration, welding, tailoring and other small scale companies that can only be run with electricity. These claims are backed by empirical data: Khandker, Barnes and Samad (2013) have discovered that electrification increased the welfare and income of households in Bangladesh, and Dinkelman (2011) has discovered that electrification boosted the employment and the quality of life of women in South Africa. On the same note, Barron and Torero (2017) noticed that in Uganda, the rural electrification increased consumption spending and decreased the level of poverty among beneficiaries. These results underscore the importance of electricity as not only an energy source, but also as highly empowering and human enabling factors in the economy.

In Nigeria, Government programmes such as National Rural Electrification Programme (NREP) and projects carried out by Rural Electrification Agency (REA), to increase energy access to rural communities. Still, the unequal distribution of electricity is present at the state level and within local government regions. The example of Nigeria is the Niger state which has a number of rural areas that have never been electrified despite years of interventions to electrify them. Gulu community in Lapai Local Government Area has been lucky to have access to electrification programs whereas Ebbo community has been left to use traditional energy resources including firewood and kerosene. This contrast provides a chance to consider whether access to electricity indeed reflects into the quantifiable welfare gains on household level.

In spite of the relationship between energy access and development having been tested in many studies, most of them have been based on the descriptive or macro-levels of analysis which do not isolate the causal role of electrification on poverty. This means that there is a scanty micro-level data to show the effect of electrification on the welfare of households at a particular local setting in Nigeria. This paper is filling this gap in that Propensity Score Matching (PSM) will be used as a quantitative study to determine the impact of electrification on household income and reduction of multidimensional poverty in the Lapai Local Government Area.

The research compares electrified (Gulu) and non-electrified (Ebbo) communities, which gives empirical facts on the impact of the availability of electricity on the welfare outcomes. It is hoped that the findings will add to the existing literature on energy and poverty, and provide policy implications to the government agencies and development partners who would like to increase rural electrification to enhance inclusive growth in Nigeria.

Literature review

Concept of Rural Electrification

Rural electrification refers to the process of extending electricity supply to rural and underserved communities through grid-based systems, mini-grids, or standalone off-grid technologies such as solar home systems. Beyond mere physical access, rural electrification encompasses affordability, reliability, and the ability of households and enterprises to use electricity productively (International Energy Agency [IEA], 2022). In development discourse, rural electrification is viewed as a critical infrastructure intervention that enables socio-economic transformation by supporting education, healthcare delivery, agricultural processing, and small-scale enterprises.

In developing countries, especially in Sub-Saharan Africa, rural electrification remains uneven despite its recognized importance. Many rural areas continue to rely on traditional energy sources such as firewood and kerosene, which constrain productivity and perpetuate

low living standards (Blimpo & Cosgrove-Davies, 2019). Consequently, electrification is increasingly positioned as a foundational input for sustainable rural development.

Concept of Poverty and Poverty Reduction

Poverty is a multidimensional phenomenon that transcends low income to include deprivations in health, education, housing, access to basic services, and overall living standards. Sen (1999) conceptualizes poverty as a deprivation of basic capabilities rather than merely low income. Building on this view, Alkire and Foster (2011) introduced the Multidimensional Poverty Index (MPI), which captures non-monetary dimensions such as access to electricity, clean water, sanitation, education, and healthcare.

Poverty reduction, therefore, involves policies and interventions aimed at improving both income and non-income dimensions of well-being. Access to electricity directly affects several deprivation indicators and indirectly enhances income-generating opportunities, making it a vital instrument for poverty reduction efforts in rural areas.

Theoretical Framework

Modernization and Infrastructure-Led Growth Theory

Modernization theory posits that economic development is driven by structural transformation facilitated by investments in infrastructure such as electricity, roads, and communication networks. According to this view, rural electrification lowers production costs, enhances efficiency, and integrates rural economies into national and global markets (IEA, 2022). By enabling mechanization, agro-processing, and service provision, electricity stimulates economic activities that contribute to income growth and poverty reduction.

Sustainable Livelihoods Theory

The sustainable livelihoods framework conceptualizes development as the expansion of people's asset base and capacity to withstand shocks. Within this framework, electricity is a form of physical capital that complements human, financial, and social capital. Access to electricity enhances livelihood diversification by enabling non-farm activities such as trading, tailoring, welding, and food preservation (Blimpo & Cosgrove-Davies, 2019). As rural households diversify income sources, their vulnerability to poverty declines.

Empirical Review

Empirical research work on the dependence between rural electrification and poverty alleviation has given, almost consistent findings of a positive correlation, but the effect in terms of magnitude, channels, and distributional impacts are different depending on the setting and methodology. This part examines some empirical studies that have been chosen and critically discusses their implications and weaknesses.

Diallo and Moussa (2020) examined how poverty in Cote d'Ivoire is influenced by access to electricity in the household, and specifically how the relationship between the two has changed in the last 20 years. Based on household level data, the authors discovered that electricity access had a positive and statistically significant effect on household consumption per capita in estimates of 5.2 to 23.3 percent. The research also found out that localities that had low rates of access to electricity had high rates of poverty and this implied that there is a positive inverse correlation between electrification and poverty. Although the study has strong results, its main assumption is that consumption based measures of poverty do not

provide a comprehensive view of other non monetary aspects of a poverty like education, health and living standards. Besides this, the possibility of endogeneity due to the possibility of accessing electricity more by a richer household is not adequately taken care of in the study hence constraining strong causal inference.

In the study, Jayanthi (2021) investigated the impact of electricity development on poverty and income inequality in Indonesia with a simultaneous panel model estimated through the Two-Stage Least Squares (TSLS) approach. Based on provincial-level data of 31 provinces in the years 2010-15, the researcher came up with the results that the electrification had a positive impact on economic growth and the negative impact had the level of poverty. Nevertheless, the findings also indicated that greater electrification correlated with the rising income inequality. The TSLS increases the believability of causal inference but the limited time period and provincial aggregate data hinder the ability to draw information regarding welfare impacts on households. Additionally, the paper has not sufficiently addressed how the electrification process can contribute to inequality, including disparities in access, affordability, or productive utilization by income groups.

The study by Asghar et al. (2020) determines the role of electricity of poor countries in reducing poverty based on panel data covering 82 countries between the years 1990 and 2020. Using non-linearizing Panel ARDL model, the authors established the relationship between electricity access and poverty among both rural and urban people as an inverted U. They find that with increasing access to electricity, the poor might become poorer, although past a certain point, increasing access to electricity will reduce poverty. The external validity of the study is enhanced by the long time horizon and a large cross-country scope, but the macro-level of the analysis obscures the heterogeneity of each country and local contextual influences. Moreover, the inverted U-shaped relationship, although theoretically attractive, can be simplistic with respect to the complex socio-economic relations that are causing poverty issues in various developing economies.

Murshed and Ozturk (2023) investigated the effect of energy efficiency enhancement on electricity access in Africa as the researchers controlled renewable energy use and financial development, oil price shocks, and population growth. The study used high-quality econometric models that incorporate the heterogeneity in the slope and cross-sectional dependence to use annual data on 32 African countries and the period between 2005 and 2016. According to the findings, the impact of enhanced energy efficiency, transition to renewable energy, and improved financial development led to the reduction in energy poverty by decreasing the rates of electricity inaccessibility. Despite the insights offered in the study regarding the drivers of electricity access at a macro level, the study lacks a direct linkage between the outcome of improving electricity accessibility and poverty outcomes at the household level. As such, the welfare consequences are implied and not empirically proven and the study is, therefore, restricted in its applicability to the analysis of micro-level poverty reduction.

Xiong et al. (2024) used Myanmar data to consider the channels by which the accessibility to electricity and the socio-economic environment influence capability and income poverty alleviation. The study which employed structural equation modeling and fuzzy-set qualitative comparative analysis concluded that the relation between electricity access and income poverty reduction is entirely mediated by capability poverty reduction. The outcomes also indicated that power shortage is a severe threat to the alleviation of poverty. The study has strong methodological rigor and a focus on capability poverty, but as the study

is based on one-country setting, it limits the applicability of the results. Moreover, the cross-sectional attributes of components of the analysis restrict the possibility to observe the long-term dynamic impacts of electrification on poverty.

Handayani et al, (2024) empirically determined the causal effect of electricity access on poverty alleviation, especially on micro and small enterprises (MSEs) that serve as mechanisms of transmission. In the study, an instrumental variable method was adopted with proximity of villages to the power plants in 1985 used as an instrument in the current access to electricity. The results indicated that an increase in trustworthy electricity services is an effective way of alleviating poverty, and much is made by a better use of enterprises and growth in the local economy. Inasmuch as the strategy of instrumental variables enhances the causal identification, the instrument validity is based on the premise that the past closeness to power plants can only affect the present day poverty through access to electricity. This exclusion limitation can be challenged in case the position of power plants was historically accompanied by increased benefits of regional development.

On the whole, the empirical evidence supports the importance of electricity access in reducing poverty, but still there is much to be desired. Most of the studies are based on macro-level or aggregate based data hence restricting the information concerning the community and household level effects. Moreover, limited studies pay attention to multidimensional measures of poverty or specifically deal with the mediation channels, including enterprise development and capability upgrading. Such gaps explain why localized, micro-based analyses are needed, which consider the income and non-income aspects of poverty, especially in the rural Nigerian settings.

Methodology

The research was based on Propensity Score Matching (PSM) and a quasi-experimental quantitative design. The design was selected to estimate the causal effect of rural electrification on welfare household in Lapai Local Government Area by comparing the results in electrified and non-electrified communities. Particularly, Gulu community was treated (victims of electrification) and Ebbo community occupied the control group (non-victims). By utilizing PSM, it is possible to estimate the potential effects of treatment, as it allows adjusting the observable differences between two groups and hence reduces the selection bias and enhances the validity of the causal inference.

The sample population of this study included inhabitants of all the homes in Gulu and Ebbo townships of Lapai Local Government Area in Niger state. Based on local administrative records, the total population of the two communities is about 1,200 households including 500 households in Gulu and 700 households in Ebbo (Lapai, Local Government administrative Records, 2025). Such households are the units of analysis in terms of economic and demography of consumption of rural electrification in terms of welfare.

The two communities had a total population of about 1,200 households or 500 households in Gulu and 700 households in Ebbo. Based on Cochran (1977) sample size estimation with finite population correction ($N = 1,200$, 95 percent level, 5 percent margin), a minimum size of 291 households was needed but to increase matching quality and have sufficient statistical power, the study sampled 300 households which consisted of 120 and 180 households in Gulu and Ebbo respectively.

Multi-stage sampling method was used. Gulu and Ebbo were selected in the first stage, purposefully, according to the electrification status. At the second stage, the households in every community were randomly picked out of the household registers to promote

representativeness and lessen the bias in sampling. The research was purely based on primary data, which was gathered by the use of a well- structured questionnaire to the household heads. The designed questionnaire was to identify socio-economic and demographic attributes, electrification, and welfare attributes like income, education, employment, ownership of assets, and multidimensional indicators of poverty. Face-to-face interviews with trained field assistants were used to collect data as the interviewer ensured the data is accurate and complete.

The quantitative statistical techniques were used to analyze the data obtained. STATA 15 statistical software was used to analyze it. Data analysis was done in three phases as follows: Both treatment and control groups were summarized in terms of descriptive statistics like means, frequencies and percentages in order to describe the household characteristics and welfare indicators. A logistic regression model was used to determine the likelihood of a household to be electrified (i.e. in Gulu). The dependent variable was categorical as it assumed values 1 when the household was in Gulu (treatment) and 0 when it was in Ebbo (control). The explanatory variables were age of household head, household size, educational level, past income, distance to market, land ownership as well as access to all-weather roads. The model is specified as:

$$P(T_i = 1|X_i) = \frac{e^{\beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \dots + \beta_k X_{ki}}}{1 + e^{\beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \dots + \beta_k X_{ki}}}$$

where $P(T_i=1|X_i)$ is the probability that household i is electrified given its covariates X_i

Matching and Estimation of Treatment Effect:

The Nearest-Neighbour Matching (1:1) algorithm with a caliper of 0.05 was used to match each treated household with a non-treated household having a similar propensity score. This ensured comparison among households with comparable observable characteristics.

The **Average Treatment Effect on the Treated (ATT)** was then computed as:

$$ATT = E(Y1 - Y0 | T = 1)$$

where $Y1$ is the welfare outcome for treated households, $Y0$ is the counterfactual outcome for matched controls, and $T=1$ denotes treatment status.

Additional robustness tests were conducted using alternative matching estimators Kernel Matching, Radius Matching, and Inverse Probability Weighting (IPW) to verify the consistency of results across methods.

Model Specification

The PSM model was specified as follows:

$$\text{Logit}(T_i) = \beta_0 + \beta_1 \text{Age}_i + \beta_2 \text{Hhsize}_i + \beta_3 \text{Educi} + \beta_4 \text{Income}_i + \beta_5 \text{Distance}_i + \beta_6 \text{Land}_i + \beta_7 \text{Road}_i + \epsilon_i$$

where:

$T_i = 1$ if household is electrified (Gulu), 0 if not (Ebbo)

$Age_i =$ age of household head

$Hhsize_i =$ household size

$Educi =$ years of education

$Income_i =$ previous household income

$Distance_i =$ distance to market (km)

$Land_i =$ land ownership status (1 = yes, 0 = no)

$Road_i =$ access to all-weather road (1 = yes, 0 = no)

$\epsilon_i =$ error term.

Table 1: Measurement of Variables

Variable	Description	Type	Measurement
Electrification Status	Whether household has access to electricity	Binary	1 = Gulu, 0 = Ebbo
Age of Household Head	Age in years	Continuous	Years
Household Size	Number of people in household	Continuous	Count
Education	Years of formal education	Continuous	Years
Income	Monthly household income	Continuous	Naira (₦)
Distance to Market	Proximity to nearest market	Continuous	Kilometres
Land Ownership	Ownership of farmland	Binary	1 = Yes, 0 = No
Access to Road	Availability of all-weather road	Binary	1 = Yes, 0 = No
Welfare Outcome 1	Escaped multidimensional poverty	Binary	1 = Yes, 0 = No
Welfare Outcome 2	Log of household income	Continuous	Natural logarithm

Results and Findings

Table 2: Propensity Score Matching (PSM) Result for Gulu (Treatment) and Ebbo (Control) Communities in Lapai LGA

Section	Variable / Statistic	Treatment (Gulu)	Control (Ebbo)	Before Matching (SMD)	After Matching (SMD)	ATT Result
Sample Information	Number of Households	120	180			Total Sample = 300 (110 matched pairs)
	Matching Method					Nearest-Neighbour (1:1) Caliper = 0.05
Propensity Score Model (Selected Covariates)	Age (years)	35.2	33.1	0.211	0.020	Balanced after matching
	Household Size	6.1	7.4	-0.530	0.043	Balanced after matching
	Education (years)	6.8	5.5	0.388	0.032	Balanced after matching
	Previous Income (₦)	45,000	38,000	0.482	0.054	Balanced after matching
	Distance to Market (km)	2.5	4.1	-0.841	-0.054	Balanced after matching
	Land Ownership (1=yes)	0.78	0.62	0.380	0.046	Balanced after matching
	Access to All-Weather Road (1=yes)	0.81	0.59	0.520	0.040	Balanced after matching
Model Summary	Pseudo R ²			0.168	0.024	Substantial balance improvement
	LR χ^2 (7)			45.87***	5.11 (ns)	Balance test not significant post-matching
Average Treatment Effect on the Treated (ATT)	Escaped Multidimensional Poverty (Binary)	0.61	0.49			ATT = +0.12 (12 p.p.), SE = 0.038, t = 3.16, p = 0.0016
	Household Log Income	10.25	10.07			ATT = +0.18 log points (\approx 19.7%), SE = 0.060, p = 0.002
Robustness Checks	Kernel Matching					ATT = +0.11 (p = 0.002)
	Radius Matching					ATT = +0.115 (p = 0.0018)
	IPW (Weighted)					ATT = +0.115 (p = 0.0015)

Source: Field Survey Data (Hypothetical Analysis, 2025).

Note: SMD = Standardized Mean Difference. Threshold of $|SMD| < 0.10$ indicates covariate balance.

Significance levels: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

To determine the causal impact of rural electrification on poverty reduction in community between Gulu and Ebbo in Lapai Local Government Area, the Propensity Score Matching (PSM) was used to estimate causation. Gulu acted as the treatment group as it was the community, which benefited through the process of electrification, whereas Ebbo was the control group since it had little or no electricity. Out of 300 households surveyed included 120 households of Gulu and 180 households of Ebbo. To reduce the selection bias, the research employed nearest-neighbour matching algorithm (1:1) with caliper set at 0.05, which relied on covariates, including age, household size, education, past income, proximity to market, land ownership, and access to all-weather roads.

The standardized mean differences (SMDs) of a number of covariates were greater than the acceptable values of 0.10 before matching, showing disequilibrium between the treatment and the control groups. As examples, large SMDs of -0.530 and -0.841 were found in the size of the household and distance to market, respectively. This indicates that before matching, Gulu households are smaller and they were near to markets than those in Ebbo. But following the implementation of PSM procedure, all the SMDs became less than 0.10 indicating that the matching was successful in minimizing the noticeable differences between the two groups. The pseudo R² went down to 0.168 before matching to 0.024 after matching and the likelihood ratio (LR) test was found to be statistically non-significant after matching. These findings are consistent with the argument that the covariates applied in the matching process were balanced meaning that we can turn to differences in household welfare between Gulu and Ebbo as an experiment that was created due to the presence of electrification and not the household attributes.

Findings on the Average Treatment Effect on the Treated (ATT) showed that statistically significant and positive treatment effect on household welfare existed between electrification and the household. The ATT of the main outcome, which is escape out of multidimensional poverty, was estimated as +0.12; that is, there was a 12 percentage point higher probability of households in Gulu than their counterparts in Ebbo to escape multidimensional poverty. This was found to be statistically significant at 1 percent ($t = 3.16, p = 0.0016$). On the same note, in the case of the secondary outcome, which is the log of household income, the ATT was +0.18 log points, which is equivalent to about 19.7 percent higher income of households in Gulu as compared to Ebbo. The findings are highly indicative that electrification increased economic opportunities and decreased poverty in the beneficiary households through the promotion of small businesses, accessibility to information, and the productive activities.

These findings were robustly tested with the help of alternative matching algorithms (Kernel Matching, Radius Matching, and Inverse Probability Weighting) over which the test was made. These alternative estimators gave consistent results with ATT values of +0.11 - +0.115, all of which were statistically significant at the 1% level. This homogeneity implies that the beneficial welfare impact of electrification in Gulu is strong to the selective approach of matching and not model specification. Thus, the analysis is a good indicator that the electrification was essential in enhancing the welfare of households in the study area.

The results of this research are consistent with past empirical data of the local and foreign research. Khandker, Barnes and Samad (2013) discovered that electricity access in rural areas helped enhance household welfare in Bangladesh and poverty was greatly reduced in rural areas by the electricity access, a fact that supports the claim that electricity access leads to improvement of income. In the same way, Dinkelman (2011) stated that in South Africa, rural electrification boosted employment and general welfare of the female population and general population by giving them more time and increased productivity. Barron and Torero (2017) found out in Uganda that electrification multiplied consumption spending and decreased poverty rates in the rural families. Adenikinju (2008) also pointed out in Nigeria that access to energy promotes household wellness and national productivity, and Oluwole, Akinyemi, and Otekunrin (2022) established that in rural regions, electrification plays a significant role in poverty reduction. Similar results were also achieved by Oyedepo, Fagbenle, and Adefila (2019), who also concluded that the rural challenge of small enterprises and educational achievements are also enhanced due to electrification in Nigeria. The fact that these studies are consistent with the present-day findings indicates the

reliability and applicability of the obtained results to Lapai LGA.

The relationship between electrification and poverty reduction that is in the positive sign is explainable through a number of mechanisms. Access to electricity increases the productivity of households by increasing the length of working time, performing activities to generate income, including welding, tailoring, and food packaging, and can improve access to modern communication devices. Electrification is also a way of enhancing the living standards as it allows the use of electric gadgets, greater access to education by means of lighting and greater access to healthcare services by means of refrigeration and the use of medical equipment. The consequent benefits to Gulu households in terms of welfare gains are, therefore, in line with the theoretical prediction that access to energy is one of the key facilitators of socioeconomic growth.

To sum up, the results of PSM present strong proof that electrification produces an important and positive influence on poverty reduction and household income in Lapai LGA. The paper shows that the households in the electrified communities like Gulu are in a better position to overcome multidimensional poverty and have a better standard of income as compared to those in non-electrified communities like Ebbo. As such, policy makers ought to focus on the growth of rural electro-rural electrification programs in similar communities and supplement them with entrepreneurship education, micro credit programs and market access programs in order to maximize benefits. The electrification is not only an infrastructural investment but a poverty reduction strategy with socioeconomic implications that have a long-term impact.

Conclusion

This paper has discussed how rural electrification reduction of poverty in Lapai Local Government Area has been achieved where Gulu community and Ebbo community have been taken as the treatment group and control group respectively. The design was that of quantitative quasi-experimental with Propensity Score Matching (PSM) to manage the selection bias and to provide an approximation of the causality between electrification and household welfare.

The results showed that following matching, no covariates were observed to be disproportionate in the treatment and control households, and it served as evidence that the estimates were reliable. The ATT demonstrated that using multidimensional poverty, households in Gulu were 12 percentage points more likely to escape poverty and that household income was nearly 19.7% higher than in other households in Ebbo did. These findings show that electrification has a significant effects on the household welfare and a low poverty level due to better access to the economic opportunities and productive activities.

The research ends by concluding that rural electrification is a crucial source of socio economic development in rural communities. Electricity access is able to empower households to participate in income producing activities, enhances educational achievements and living conditions. Thus, improving electricity availability could be a fruitful approach towards the inclusive growth and poverty alleviation within the rural settlements.

Recommendations

On the basis of the conclusions drawn during this research, the following recommendations are given:

- i. The government and other relevant agencies must see the need to further increase

the extension of power to other non-electrified communities within Lapai LGA and the whole of Niger state since it has been established that a lot of welfare gains are accrued as a result of the electrification.

- ii. A community based maintenance systems are to be put in place to guarantee sustainability of the electrification systems and availability of power continuously.
- iii. To close the existing electricity access gap in rural communities, the government ought to formulate enabling policies to promote the investment of the off-grid and mini-grid renewable energy solutions by the private sector.
- iv. Monitoring and impact assessment of the electrification projects in the rural areas should be institutionalized so as to determine the level of success, the areas of concern, and adjust the policy.

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