

Has Kenya's Governance Reforms in the Energy Sector Enhanced Access to Electricity in Rural Areas?

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Abstract

Access to clean and affordable electricity in rural areas is very critical towards improved living standards, economic growth, and development of Kenya at large. Kenya has over the years implemented various reforms in the electricity sub-sector with the aim of accelerating the pace of rural electrification. Nevertheless, there is dearth of evidence on the effects of these reforms on rural electrification. The study sought to evaluate the effect of governance reforms in the electricity energy subsector on rural electrification. We adopted a survey design with a sample size of 384 drawn from rural households in Kakamega, Uasin Gishu and Nyandarua counties. Data was collected using questionnaires analysed by both descriptive and multiple logistic regressions. Findings show that enhanced accountability and decentralization in the electricity sub-sector has a positive effect on access to electricity in rural Kenya. Nevertheless, stakeholder participation has no effect on rural electrification. In addition, there is a low level of citizen participation in the rural participation projects. We suggest that the government should sensitize the rural population on the reforms in the electricity sub-sector and provide a platform for citizens to participate in electrification projects.

Key Words: Access to electricity, governance reforms, Logistic regression, Rural.

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1. Introduction

Access to affordable and appropriate energy services must and should grow significantly to improve the standard of living of the world's growing population (Andreas et al., 2007). According to International Energy Agency (IEA) and World Bank's state of electricity access report, there remain 1.06 billion people globally without access to electricity, and about 3.06 billion people still use solid fuel and kerosene for cooking and heating (IEA & World Bank, 2017). Electricity enhances provision of social services by providing reliable heating, refrigeration of vaccines and other medicines, sterilization of equipment in health facilities, and provision of lighting in learning institutions which enables students to study at night (Bernard, 2012) This provides sufficient time for study and hence increased employability potential. Electricity access can also provide solutions to poverty indirectly through productivity enhancement which aids in income generation via development of agriculture (irrigation and storage) as well as powering small scale rural industry. Furthermore, to increase access to safe drinking water, provision of clean energy such electricity for pumping and boiling water is inevitable. According to the World Bank (2018), besides lighting which improves the study environment for schoolchildren, electricity also improves business, thereby providing employment opportunities. Electricity is essential for the operation of appliances such as computers, televisions, radios and mobile phones, which are important in relaying information to the rural households. In financial terms, electricity replaces expensive traditional fuels such as kerosene and firewood. Therefore, access to electricity and rural poverty are closely correlated.

IEA and World Bank report of 2017 on electricity access estimates that around 92% of the rural population (370 million people) in Sub-Saharan Africa lacked access to electricity (see Figure 1); 70% (690) in south Asia; 48% (60 million) in Latin America; 22% (30 million) in North Africa (IEA & World Bank, 2017). This is particularly critical for African countries since research shows that electricity access and consumption cause economic growth implying that, the economy depends on energy for survival and vice versa (Odhiambo, 2009). This calls for clean energy growth paradigm that focuses on expanding access to energy services through innovative models. Using clean energy efficiently and applying cost effective technologies and systems to all sectors of the economy within a

capital constrained context remains a major challenge in Africa. This makes the availability of electricity energy an absolute pre-requisite to economic and social development in Africa.

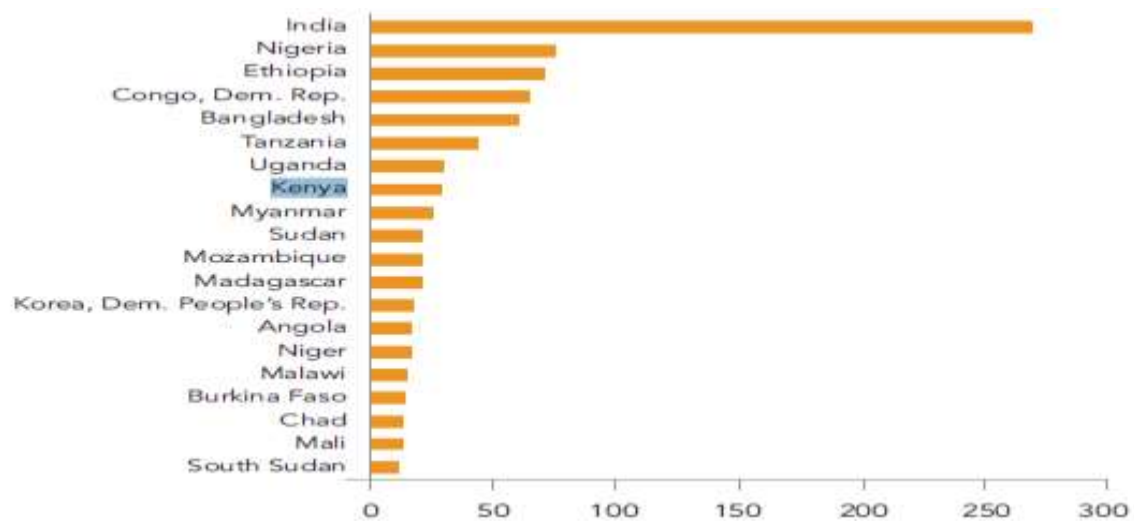


Figure 1: Top 20 countries for access deficit in electricity

Source: IEA and World Bank (2017)

Kenya's sessional paper number 4 on Energy (2004) lays out the foundation for the formation of the Rural Electrification Authority (REA), which is charged with the responsibility of accelerating the pace of rural electrification in the county and ensuring that that affordable, cost effective and adequate quality of electricity is made available to rural areas on a sustainable basis. REA was created in 2007 under section 66 of the Energy Act of 2006 with the principal mandate of extending electricity supply to rural areas, managing the rural electrification fund, mobilizing resources for rural electrification and promoting development use of receivable energy (GOK, 2014).

Power sector reforms were initiated in Kenya to respond to internal and external factors (Sen, 2010). Internally, the power utility firms in Kenya were gripped by inefficiencies, wastage, and lethargy. While the demand for electricity was growing fast, the requisite investment in the sector was not responsive (IEA 2010). The country was at the same time facing dwindling donor support and the desire to reduce fiscal drain on the public-sector purse (Wamukonya, 2007). Similarly, there was a need to improve the efficiency and quality of the services which has a link with attracting investments (Johannsen, 2003). On the external front, there was a broad shift from state ownership and state regulation to market-based structures (Jamasb, 2005). It was therefore necessary to implement governance reforms. These reforms included unbundling of power generation from transmission and distribution, facilitation of the entrance of private power generating firms to enhance efficiency in power delivery, and encourage, establishment of the power regulator, and provision of a framework to integrate consumers interest in the power reforms process (Zhang, 2012).

In the year 2004, the government of Kenya committed itself to unbundle power transmission and distribution function of the KPLC which resulted into Sessional Paper No. 4 of 2004 on Energy. Government's efforts were materialized in 2008 when Kenya Electricity Transmission Company (KETRACO) was registered. KETRACO plans, designs, constructs, operates and maintains its own power transmission lines (KETRACO, 2013). However, KPLC still has their old transmission lines. Reforms in the energy sector reached its climax following the enactment of the Energy Act No. 12 of 2006 (now repealed 2019), which combined all laws associated to energy including electricity regulations (Sen, 2010). In addition, this Act provided provisions for establishment of Energy Regulatory Commission (ERC) now called Energy and Petroleum Regulatory Authority (EPRA) as the only agency mandated to regulate both economic and technical aspects of electric power, renewable energy and petroleum sub-sectors. Under this law, EPRA is supposed to ensure that there is level playing field in the electricity sector, and where consumers are protected, as well as participate in the reform process. EPRA regulates electricity generation, transmission and distribution. It also responsible for setting and reviewing tariffs, licencing, law enforcement, settlement of disputes and sanctions power purchase agreements. These responsibilities are very central to consumer interest and accessibility to power. The reforms have affected internal organizational dynamics

leading to changes in pricing, planning systems, regulations, institutions, and demand management strategies for achieving favorable economic outcomes.

These reforms also brought changes in the governance of the electricity sub-sector. For instance, decision making associated with tariff, pricing and regulation was decentralized from the ministry of energy to ERB and EPRA, with the main purpose of ensuring better service delivery. The implementation of effective electricity reforms should enhance access to electricity to the population. Mwangi, et al., (2014) links reforms to enhanced physical availability, affordability, efficiency, and service quality. This is however not yet clear for Kenya (IEA, 2010; Onyango et al., 2013; Mwangi et al., 2014; and Lee et al., 2016). Even though the national electrification in Kenya is much higher than the SSA, with national access of 69.7% compared to an average of 47% for SSA rural electrification rates has been slow with only 32% compared to 80% for the rest of the world (World, 2019). In this case, low electricity access is choking economic growth in the rural areas and holding back many communities' efforts to improve their livelihoods (WB, 2018). Studies notably by Lee et al., (2016) show that there is a large gap between poverty levels and electrification rates in Kenya which points to significant suppressed demand. While only 50% of the rural population is below poverty line, 93% of them do not have access to electricity (Lee et al., (2016).

In Kenya, literature is limited on the effects of governance reforms in the electricity sub-sector on rural electrification. A few studies carried out have mainly focused on factors driving electricity connectivity and not how reforms affect connectivity. For instance, recent studies by Mwangi et al. (2014) and Lee et al. (2016), have all focused-on drivers of adoption of electricity in rural areas. Thus, we address this knowledge gap using survey data from Kakamega, Uasin Gishu and Nyandarua counties. The next sub-section focuses on the methodology of the study.

2. Methodology

Governance is defined as the process in which decisions are implemented or not implemented or the manner in which public affairs are conducted (World Bank, 1994; Kaufmann, 2000). "Governance" is the "manner" in which power is exercised in the management of a country's socio and economic resources for development. Kaufmann (2000) further looks at government in three practical dimensions – process by which those in authority are selected, monitored and replaced, economic dimension – the governments capacity to effectively manage its resources and implement sound policies, institutional respect dimension – the respect of citizens and the stake for the country's institutions. Participation of stakeholders (customers), i.e. their knowledge and views on various reforms and incentive programs will be investigated to ascertain how it affects access to electricity in the rural areas. In addition, the effect of accountability and decentralization in the electricity sub-sector was also examined.

The study adopted across-sectional research design with quantitative approach. Households in three counties, that is, Kakamega, Uasin Gishu and Nyandarua. Kakamega county is the second largest county after Nairobi in terms of population (KNBS, 2019). It borders counties; Siaya to the West, Vihiga to the South, Bungoma to the North and Nandi to the East. It occupies an area of 3050.3 km² with an altitude of between 1,240 and 2,000 metres above sea level (Institute of Economic Affairs, 2013). The county has a total population of 1,867,579 which comprises of 897,133 females and 970,406 males (Kenya Population, Housing and Census (KNBS, 2019). The county has 433,207 rural households (KNBS, 2019), 177 transformers (KPLC, 2019) and electrification rate of 5.6%. According to Integrated Household Budget Survey (KIHBS) of 2015/2016, the head count poverty in Kakamega county stands at 35.8 percent (672,000), slightly below the national rate of 36.1 percent (KNBS, 2018). Uasin Gishu County has a total area of 3,345.2 km² and borders Transzoia county to the North, Baringo county to the South East, Elgeyo Marakwet county to the East, Kakamega county to the North West, Bungoma to the West and Kericho county to the South. KPHC (2019) indicate that, the county has a total population of 1.163 Million with male to female ratio of 1:1. This county is a highland plateau ranging between 1500m and 2700m above sea level. The head county poverty in Uasin Gishu stands at 41.0 percent or 465, 000 residents are living below poverty line, and occupies position 23 in the county ranking. This county is the main hub of agricultural farming activities of commercial cultivation of maize and wheat on large scale. Other crops cultivated in this county are: beans, potatoes and peas for subsistence and commercial purposes. The county has a total population of 124,207 rural households, 92 transformers and electrification rate of 27.9%. Nyandarua County Nyandarua County borders Laikipia to the north and north east, Murang'a and Nyeri to the east, Nakuru to the west and south west, and Kiambu to the south. According to the National census statistics of 2019, Nyandarua County has a total population of 638, 289 with 51% females and 49% males. According to KNBS (2016), Nyandarua county has a total population of 120,123 rural households. The county with 167 transformers has an electrification rate 10.5%. Kenya Integrated Household Budget Survey of 2015/2016 shows that Nyandarua county has 34.8 percent poverty rate by head count (465,000) (KNBS, 2018). This rate is also slightly below the national poverty rate of 36.1 percent. Nyandarua county is ranked at position 19, indicating that its residents are more resourced than Kakamega and Uasin Gishu.

The study sampled 384 house households through simple random approach. For one to participate in the study, he/she ought to have attained 18 years and above, be of sound mind and residing in the rural set-up. Data was collected through administration of household questionnaires and analysed using both descriptive and inferential statistics with the aid of Scientific Package for Social Sciences (SPSS) software version 21.

3. Findings

Out of 384 questionnaires, 360 representing 93 % were filled in and returned. This response rate was considered enough for data analyses and drawing of conclusions. According to socioeconomic characteristics, there were slightly more female respondents (51.9%) than their male counterpart (48.1%). Concerning marital status, majority of the respondents, 251(69.7%) were married followed by 14.7% who were single. In addition, 10.6% are widowed while only 14(3.9%) of them had either separated or divorced. Regarding the age of the respondent, the study reports that the average age was 40 years with a standard deviation of 14. The age ranged between a minimum of 20 and a maximum of 90.

On education, most respondents, 138(38.3) had primary level certificates as their highest level of education, followed by 126(35%) who had attained secondary level of education. Concerning occupation, findings show that majority of the respondents, 35% are unemployed followed by the self-employed at 31.1%. In addition, these statistics indicate that 33(9.2%) of the respondents are in formal employment, 50 (13.9%) earn their livelihood through daily labor while the remaining 8.1% of the respondents undertake other economic activities. Access to electricity in the three counties stands at 39.4 percent while non-accessibility accounted for 60.6 percent of the respondents polled.

In terms of the county connectivity, Table 1 indicate that Uasin Gishu county has the highest percentage of rural population with access to electricity (65.82%) followed by Nyandarua at 49.3%, and finally, Kakamega has the lowest at 25.84%.

Table 1: County wise Access to Electricity

| County | Household connected to the nation grid (electricity) | | Total |
|-------------|--|--------------|-------|
| | No | Yes | |
| Kakamega | 155 (74.16%) | 54 (25.84%) | 209 |
| Uasin Gishu | 27(34.18%) | 52 (65.82%) | 79 |
| Nyandarua | 36(50.70%) | 35(49.3%) | 71 |
| Total | 218 (60.56%) | 142 (39.44%) | 360 |

Source: Authors (2020)

The study sought to evaluate various governance issues through a series of questions to the respondents. The study began by asking respondents on whether REA, now referred to as Rural Electrification and Renewable Energy Corporation (REREC, 2019) involves them in making decisions. According to the findings, most respondents, 147 (47.7% %) disagreed with only 5.2 % stating in the affirmative. In addition, 145 respondents representing 47.1 % were unaware. These results imply that generally, most of the rural households are not involved in decision making by REREC.

In addition, the study enquired from the respondents where they took their complaints to in case of challenges in accessing or utilization of electricity. Findings reveal that most of the complaints are reported to KPLC at 86% followed by REREC and EPRA at 1.1 % each. The rest of the respondents did not respond to this question. This imply that either most households are more familiar with KPLC than other institutions within the electricity sub-sector or most of the complaints falls within the performance of KPLC.

When asked about availability of REREC offices in the locality, only 33 households representing 10.3% of those polled indicated yes, while 85 respondents accounting for 26.6% indicated no. Nevertheless, majority of the households, 201(63%) indicated having no knowledge of the existence of REREC offices. These results imply that the presence of REREC in rural areas is not very visible. Furthermore, the households were required to indicate their level of agreement with the following statement related to governance issues in the Kenya's electricity sub-sector using Likert scale of 1-5, where 1-strongly disagree (SD), 2 disagree (D), 3-neutral (N), 4-agree, (A) 5-strongly agree (SA). Table 2.

Table 2: Governance Reforms Summary Statistics (N=360)

| Construct | Mean | Std. Deviation |
|--|--------|----------------|
| Kenya Power (KP), REREC, EPRA are very effective and efficient in their service delivery; | 3.1472 | .98059 |
| KP efficiently provides electricity in rural areas; | 3.1694 | .97413 |
| Incidences of power blackout determines access to electricity by rural households in Kenya; | 2.9167 | 1.02816 |
| I like the level of response to power blackout by KPLC. | 2.8333 | 1.12703 |
| There is adequate citizen participation in governance of rural electrification projects to ensure successful completion; | 2.8556 | 1.05620 |
| EPRA has minimized incidences of corruption cases in the electricity sub-sector in Kenya; | 2.9806 | .92152 |
| Participation of consumer organizations in the energy sector's reforms has had a considerable impact on electricity access in rural Kenya; | 3.0223 | .90285 |
| Consumers are well represented in the Kenya's energy sector structure; | 2.9861 | 1.02195 |
| Management wrangles in the electricity sub-sector has affected electricity connectivity in rural Kenya; | 3.2556 | 1.02949 |
| Legal framework provides for participation of civil society groups such as consumer organization in legal reforms within the energy sector in Kenya; | 3.1222 | .79452 |
| Decentralization of decision making from the ministry to EPRA has improved connectivity to electricity | 3.2278 | .84002 |
| The establishment of Energy Regulatory Commission (an independent commission) has improved access to electricity in rural areas | 3.2312 | .82525 |
| There is a framework for consumer interest representation such as redress mechanisms and a platform for effective consumer participation in regulatory reform process; | 3.1500 | .79676 |
| The presence of consumer interest representation in EPRA has led to increased electricity demand in rural areas; | 3.3250 | .81589 |

Mean Strongly Disagree=1-1.4, Disagree=1.5-2.4, Neutral=2.5-3.4 Agree=3.5-4-4, Strongly Agree=4.5-5

Source: Author (2020)

According to the statistics, majority of the respondents were neutral on the assertion that Kenya Power (KP), REREC, EPRA are very effective and efficient in their service delivery (mean=3.1472), KP efficiently provides electricity in rural areas (mean=3.1694), and incidences of power blackout determines access to electricity by rural households in Kenya (mean=2.9167). In addition, the study finds respondents agreed on the statement that they like the level of response by KP concerning power blackouts but, overall, majority were neutral given a mean score of 2.8333, while on the question of whether there is adequate citizen participation in governance of rural electrification projects to ensure successful completion, most households were undecided with a mean of 2.8556.

Furthermore, the study indicates that most respondents remained neutral of the assertion that EPRA has minimized incidences of corruption cases in the electricity sub-sector in Kenya, and participation of consumer organizations in the energy sector's reforms has had a considerable impact on electricity access in rural Kenya with a means of 2.9806 and 3.0223 respectively. Similarly, most households are neutral on the arguments that consumers are well represented in the Kenya's energy sector structure, management wrangles in the electricity sub-sector has affected electricity connectivity in rural Kenya, and legal framework provides for participation of civil society groups such as consumer organization in legal reforms within the energy sector in Kenya with the means of 2.9861, 3.2556 and 3.1222 respectively.

The same findings were reported on the question of whether decentralization of decision making from the ministry to EPRA has improved connectivity to electricity, the establishment of Energy Regulatory Commission (an independent commission) has improved access to electricity in rural areas, and whether there is a framework for consumer interest representation such as redress mechanisms and a platform for effective consumer participation in regulatory reform process. Finally, majority of the households were neutral on the assertion on whether the presence of consumer interest representation in EPRA has led to increased electricity demand in rural areas.

3.1 Logistic Regression Between Governance Reforms and Electricity Access

To conduct regression analysis between access to electricity and governance reforms, the study employed Principal Component Analysis to reduce variables in the governance reforms Likert scale items into participation, accountability, and decentralization. Access to electricity was a binary variable with 1=yes for electricity access and 0 otherwise. Logistic regression was conducted where access to electricity variable was regressed on governance reform variables. Table 3 presents model summary. The findings for Cox & Snell R Square and Nagelkerke R Square show that the predictor variables (governance reforms) explain the explained variable (electricity access) by 0.043 and 0.059 respectively. This imply that governance reforms indicators have a lower predictive power on the electricity access in rural areas (Kenya). Table 3 presents model summary.

Table 3: Model summary on governance reforms and electricity access

| -2 Log likelihood | Cox & Snell R Square | Nagelkerke R Square |
|----------------------|----------------------|---------------------|
| 463.334 ^a | .043 | .059 |

Source: Authors (2020)

Regarding classification table (Table 4), the results show an overall percentage of the probabilities of 62.8% which is greater than the cut value of 0.5 or 50%. This indicates a high level of accuracy and thus, the results can be relied on.

Table 4: Classification Table on governance reforms and electricity access

| Observed | | Predicted | | |
|-----------------------|-----|-----------------------|-----|--------------------|
| | | access to electricity | | Percentage Correct |
| | | no | yes | |
| access to electricity | no | 192 | 26 | 88.1 |
| | yes | 107 | 33 | 23.6 |
| Overall Percentage | | | | 62.8 |

a. The cut value is .500

Source: Authors (2020)

Finally, summary statistics which includes the coefficients, p-values and odd ratios are presented in Table 5.

Table 5: Logistic regression coefficients (Variables in the Equation)

| | B | S.E. | Wald | df | Sig. | Exp(B) |
|------------------|-------|------|--------|----|------|--------|
| Participation | -.143 | .113 | 1.600 | 1 | .206 | .867 |
| Accountability | .346 | .116 | 8.919 | 1 | .003 | 1.413 |
| Decentralization | .249 | .112 | 4.947 | 1 | .026 | 1.283 |
| Constant | -.463 | .111 | 17.343 | 1 | .000 | .629 |

Dependent variable: Access to electricity

Source: Authors (2020)

The coefficient for participation indicates a negative relationship with electricity access in the rural Kenya. Nevertheless, this variable is not statistically significant given a p-value of 0.2056, greater than 95% confidence interval. In addition, the odd ratio of 0.867, less than 1 is an indication that the probability of participation to influence access to electricity in rural areas is very low. These findings could be attributed to the fact that not many beneficiaries are involved in decision making concerning the operations of the electricity sub-sector.

Qualitative interview with both REREC and EPRA officials on the issue of participation, reveals that there is no legal framework for conducting public participation but, this is done as a constitutional requirement. They noted that they conduct workshops in all counties whenever there is a need such as approval of tariffs, to get feedback from consumers or consumer organizations like COFEK. However, EPRA through its officer observes that majority of rural populace are ignorant of the regulatory policies or processes in the sector and hence, getting feedback from consumers is difficult.

With regard to accountability, the study has established a positive and statistically significant effect (0.346, p-value=0.003). This imply that accountability, affects electricity connectivity in the rural areas of Kenya, positively. In addition, the odd ratio (1.413) indicates that a unit change in accountability has a chance of increasing electricity

access in rural area by about 1.413 times. In other words, accountability with the electricity energy sub-sector has a higher predictive power on electricity access in rural areas. Accountability in the electricity sub-sector could increase confidence of both investors and beneficiaries as well as other stakeholders, and hence, improved access to electricity. Brown and Mobarak (2012) observes that weak accountability within the electricity sub-sector institutions weakens the distribution of electricity to some groups and the allocation.

The positive impact of accountability could partly be explained by accountability measures in the electricity sub-sector. Qualitative interview with KPLC, REREC and EPRA has established that there are proper accountability mechanisms for all institutions within the energy sector. For instance, an interview with both EPRA and Kenya power officials reveals that their management and accounts are audited by the auditor general while their budgets have to be approved by the treasury. In addition, it was established that these mechanisms are very sufficient to ensure that the institutions are top on their game.

Similarly, the study has found positive relationship between decentralization and access to electricity in the rural areas. This is shown by the positive coefficient of 0.249 with a p-value of 0.026 which is less than 0.05. Additionally, the study has established an odd ratio of 1.283 indicating that the decentralization variables predict access to electricity highly. These results imply that the efforts made by the government to decentralize the electricity energy sub-sector through unbundling, has a positive effect on electricity access in rural Kenya. Consistent with these findings is the study by Brown and Mobarak (2009) who found a positive relationship between decentralization of the power sector and access to electricity. In addition, Burke (2012) reports that dismantling of monopolies in the power to allow private players bring competitiveness which leads to effectiveness with consumers as the final beneficiaries.

4. Conclusion and Policy Recommendation

We conclude that governance reforms in the electricity sub-sector particularly accountability and decentralization have a positive impact on rural electrification. In addition, the study concludes that there is low participation of households in the rural areas in electrification programs undertaken by REREC. Furthermore, most households in rural Kenya are not aware of REREC or even where their offices are. Based on these conclusions, the study recommends that REREC should provide a platform which encourages rural households to participate in electrification programs. Rural populace should specifically be educated on their role in the electrification, participation, the electrification subsidies, and other funds available.

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