

Electricity access at health clinics in rural Sierra Leone

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In brief

- There are a total of 1,174 Peripheral Healthcare Units in Sierra Leone, encompassing Maternal and Child Health Posts (MCHPs), Community Health Posts (CHPs), and Community Health Centres (CHCs).
- While most clinics have some access to electricity, the majority of clinics lack reliable energy access throughout the day. This constrains medical service delivery as lighting, sterilization and refrigeration capacities are limited.
- The Government of Sierra Leone aims to increase health clinics' access to electricity through the Rural Renewable Energy Project (RREP). The project is implemented by the United Nations Office for Project Services (UNOPS).
- This brief reports on close to 200 health care facilities across 14 districts of Sierra Leone. Half of the clinics recently received free access to off-grid solar electricity through the RREP project.
- The RREP project has been successful in increasing access to energy for rural health clinics. However, more must be done to improve the reliability and availability of electricity at clinics.
- This brief points to policies which can improve the implementation of the programme in Sierra Leone and elsewhere, boosting the quality of healthcare services through rural electrification.

Policy motivation for research

In Sierra Leone, over 60 percent of people die before the age of 70, mostly due to preventable or treatable causes. In 2019, the estimated life expectancy was 54 years old, and estimates show that both the under-5 child mortality rate and maternal mortality rate are among the highest in the world.¹ Health care is provided largely in government-run clinics and hospitals, while traditional village birth attendants and healers also operate throughout the country.² The Peripheral Healthcare Units (PHUs), which provide primary care, include Maternal and Child Health Posts (MCHPs), Community Health Posts (CHPs), and Community Health Centres (CHCs).³ These clinics focus largely on maternal and child health care, providing services such as immunization, maternity care, and basic laboratory services.⁴ As of 2017, there were a total of 1,174 PHUs in Sierra Leone.

Clinic staff report that the availability of electricity is a major constraint on the services they can provide. The World Health Organization reports that 1 in 4 clinics in Sub Saharan African have no electricity.

¹ Carshon-Marsh, Ronald, Ashley Aimone, Rashid Ansumana, Ibrahim Bob Swaray, Anteneh Assalif, Alimatu Musa, Catherine Meh, et al. 2022. "Child, Maternal, and Adult Mortality in Sierra Leone: Nationally Representative Mortality Survey 2018–20." *The Lancet Global Health* 10 (1): e114–23. [https://doi.org/10.1016/S2214-109X\(21\)00459-9](https://doi.org/10.1016/S2214-109X(21)00459-9).

² Denney, Lisa, and Richard Mallett, 2014. "Mapping Sierra Leone's Plural Health System and How People Navigate It."

³ "Human Resources for Health Strategy 2017-2021." n.d., 87.

⁴ Christensen, Darin, Oeindrila Dube, Johannes Haushofer, Bilal Siddiqi, and Maarten Voors. 2021. "Building Resilient Health Systems: Experimental Evidence from Sierra Leone and The 2014 Ebola Outbreak*." *The Quarterly Journal of Economics* 136 (2): 1145–98. <https://doi.org/10.1093/qje/qjaa039>.

Electrification may enable clinic staff to better provide healthcare at night, such as caring for those injured in road accidents or delivering babies. Electricity also enables the use of appliances such as freezers which allow for vaccine and drug storage.

Through the implementation of the Rural Renewable Energy Project (RREP), the government, donors, and other stakeholders aim to provide access to off-grid solar electricity in up to 97 communities in Sierra Leone. The RREP first aimed to provide electricity to each of the health clinics located in these communities. The United Nations Office for Project Services (UNOPS) has been supporting the government in this effort, a project funded by the UK Foreign, Commonwealth & Development Office (FCDO) and worth over UKP40 million.

Electrification of health clinics has been the project's first priority in each community. This policy brief brings insights from the impact evaluation of health clinics involved in the first and second phases of the project, which provided communities across 14 districts of Sierra Leone with access to off-grid solar electricity through the construction of 97 mini-grids.

Overview of the research

The findings are based on data collected during baseline (2019) and follow-up (2021) surveys to evaluate RREP's impact on health clinic productivity and community health outcomes. A representative sample of clinics in communities where mini-grids have been installed was compared with a representative sample of clinics in statistically similar communities where no mini-grid was installed.

Across the baseline and follow-up surveys, the impact evaluation team interviewed representatives of 198 clinics across Sierra Leone to understand how access to electricity had impacted the clinics.

Key findings

Number of clinics connected

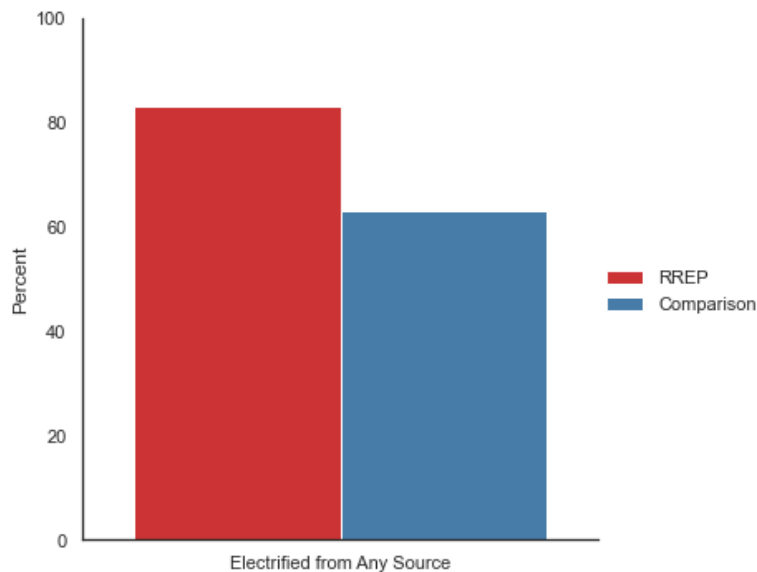


Figure 1. Percentage of Clinics Electrified

This figure shows that 83 percent of clinics located in RREP communities have access to electricity at follow-up, while just 63 percent of clinics located in comparison communities have access to electricity at follow-up.

We see that a larger percentage of clinics in RREP communities have access to electricity, as compared to clinics in comparison communities. In total, 57 clinics (29 percent) report at follow-up that the mini-grid is their main source of electricity.

Most clinics in the sample were electrified in 2017 to enable Ebola containment efforts. Since then, the RREP has electrified all clinics in the first phase communities, and around 61 percent in second phase communities. This resulted in a substantial positive impact on electricity access.

Among health clinics that benefited from the first phase of the rural electrification project, 78 percent had at least 10 hours of electricity per day, compared to just 37 percent in other communities. By providing light throughout the day, the mini-grids enabled health clinics to remain open and deal with emergency patients at night. One of the Community Health Officers (CHO) remarked:

“Many mothers are coming in late in the evenings when we have no electricity and need to be taken care of. We of course try to do our best, but if we have no light, it is very difficult for us to make sure the delivery goes well.”

– CHO during a KII

Hours of electricity per day

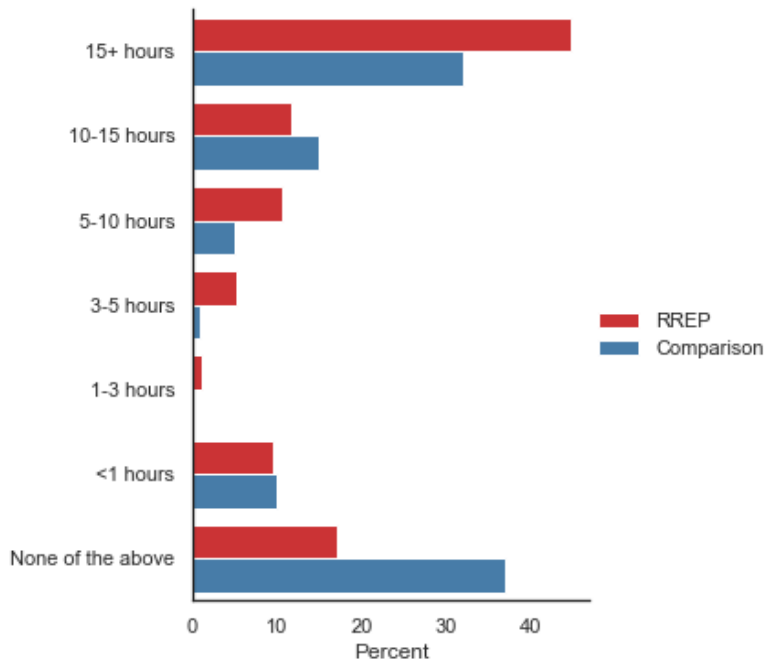


Figure 2. Number of Hours of Electricity Per Day

This figure shows that 45 percent of clinics located in RREP communities have 15+ hours of electricity per day, in contrast to 32 percent of clinics located in comparison communities. 37 percent of clinics located in comparison communities report having zero hours of electricity per day.

We see that more RREP clinics report having 15+ hours per day of electricity than comparison clinics (45 percent versus 32 percent). Furthermore, 37 percent of comparison clinics report not having electricity, in contrast to 17 percent of RREP clinics. The percentage of RREP and comparison clinics receiving under one hour of electricity per day is approximately equal, around 10 percent.

In interviews and focus groups, health staff remark that the first order benefit of the solar mini-grids is to provide electricity in the evenings. If the clinic has not yet been electrified, the clinic staff must use torch lights to treat patients as soon as it gets dark. Reliable and constant electricity enables the staff to care for patients after dark in a safer manner. This is particularly important for patients who come to the clinic at night to give birth or to receive treatment after a road accident. One CHO in Bombali District remarked:

“Electricity is necessary to have safe deliveries for babies. There was one time where we had no light, we were using a torch light, and when it came to snip the umbilical cord for the baby we cut too close and had to treat the baby to ensure they didn’t die. Thankfully the baby was okay, but if we had light, this would have never happened.”

– CHO in Bombali District

Working electrical appliances

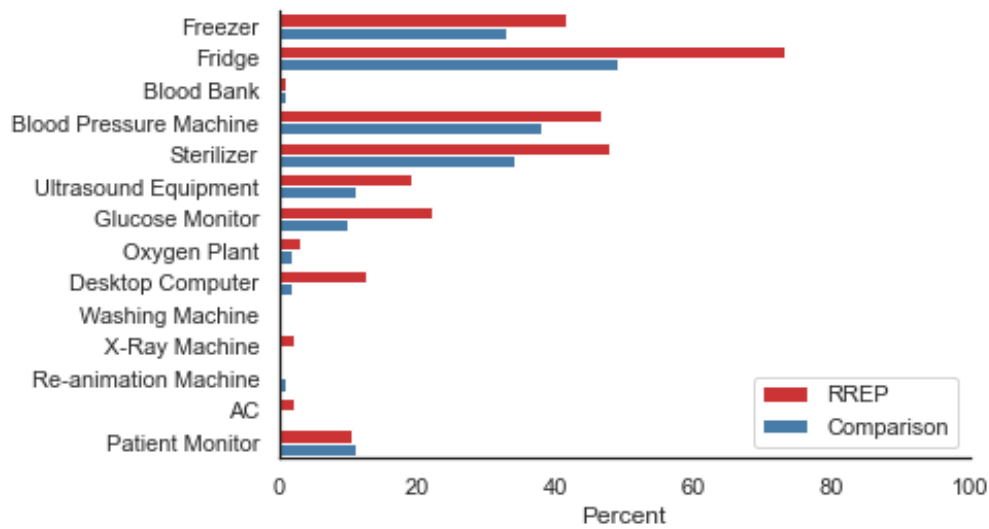


Figure 3. Percent of Clinics Owning Types of Working Appliances

The fridge is the most common working appliance, available in 73 percent of RREP clinics and 49 percent of comparison clinics. A higher percentage of RREP clinics than comparison clinics own many of the appliances, including freezers and blood pressure machines.

Energy access through RREP increased the appliances available at clinics. RREP clinics are more likely to have a working freezer, fridge, blood pressure machine, sterilizer, ultrasound equipment, glucose monitor, oxygen plant, desktop computer, x ray machine, air conditioning, and patient monitor. The fridge is the most common working appliance, available in 73 percent of RREP clinics and 49 percent of comparison clinics. A working freezer is available in 41 percent of RREP clinics and 33 percent of comparison clinics.

In focus groups and interviews, clinic staff reported that the freezers at many of the health clinics have either been broken or are not large enough to hold all the needed vaccines and drugs for the size of the community. Enabling the establishment of functional freezers and stabilizers would allow safe storage of vaccines and drugs, while microscopes would enable treatment of complicated malaria or TB cases.

Satisfaction with electricity connection

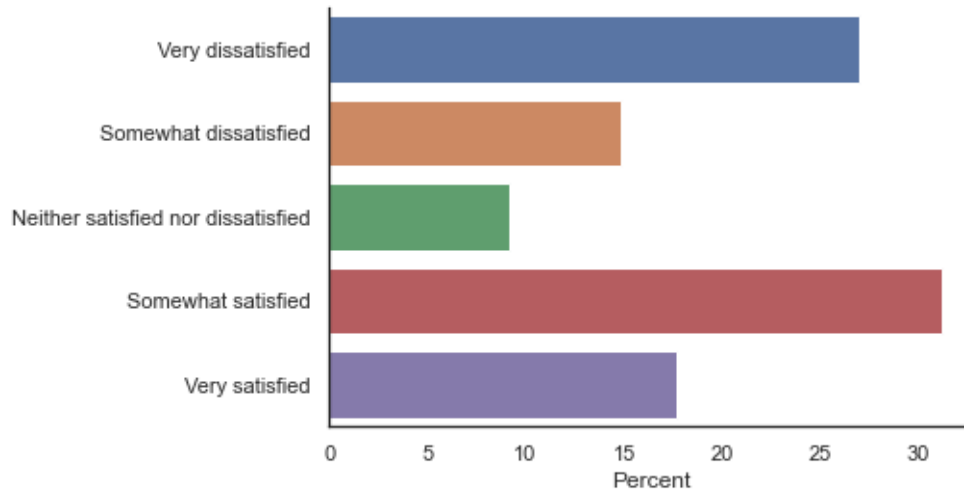


Figure 4. Clinics' Satisfaction with Electricity Connection

This graph present clinics' reported satisfaction with their electricity connection. 42 percent of clinics report being dissatisfied with their electricity connection, 49 percent report being satisfied, and 9 percent are neutral.

Approximately half of the surveyed health workers report being satisfied with the electricity connection. Many of the clinic staff do not have light in their quarters, even if the clinic itself is electrified. Clinic staff reported that they believe that electrification of both the clinic and clinic quarters would incentivize staff to remain working at the clinic for a longer period of time, as well as improve performance. Currently, many clinics have a high staff turnover rate. This may in part be due to staff leaving to go to communities where they have electricity and life is easier for them. Having light would enable clinic staff to feel more comfortable, secure, and protected from thieves in the evening time. They could also use the electricity to charge their personal mobile phones, which could be used to call an ambulance if needed.

"There are only two of us who work here, and patients are coming 24/7 where they knock on our doors if they need to be seen. This would be fine if there was light all the time, but what happens is the light goes off the same time as it does in the community, and we cannot see unless we purchase torch lights. This means we can hurt ourselves on accident very easily. We as staff should be taken care of first, that way we can properly take care of everyone else in the community."

– CHO in Moyamba district

Perceptions of clinic

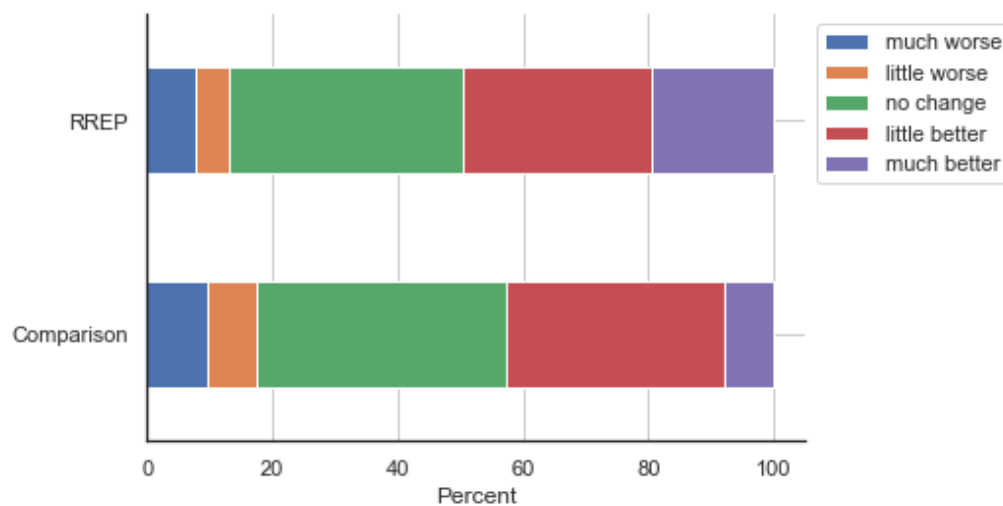


Figure 5. Perceived Change in Clinic Quality Over Past Six Months

This figure shows how clinic respondents report the quality of the clinic has changed in the past six months. 18 percent of comparison clinics report the clinic has become worse, while 13 percent of RREP clinics report the clinic has become worse. Most respondents, across both RREP and comparison clinics, report there has been no change in clinic quality.

The perception of clinic quality is increasing in RREP clinics. When asked how the quality of the clinic has changed in the past six months, around 20 percent of RREP clinics report that the clinic is “much better” than earlier compared to just 8 percent in comparison clinics.

Policy recommendations

Below are four recommendations targeted at both policymakers and UNOPS for continuation of work on the RREP and future projects.

- 1. Electrify entire clinics, including the living areas of staff.** In focus groups and interviews, clinic staff report that they believe having electrified staff living areas will make it easier to retain staff members. They also reported that they believed it would incentivize better staff performance.
- 2. Increase access to working larger appliances.** Clinics located in RREP communities had higher rates of owning working electric appliances than clinics located in comparison communities. However, there is still a lot of work to be done in this area. Only around 40 percent of clinics in RREP communities owned working freezers at follow-up. Increasing access to appliances such as freezers and fridges would allow for clinics to safely store vaccines and drugs.
- 3. Increase access to small, electricity-powered health devices.** Devices such as CRADLE (a blood pressure and heart rate tracking device) can go a long way towards improving healthcare services. The CRADLE device helps healthcare workers determine when pregnant women are at risk using a simple traffic light warning system. This device, and other similar devices, use low levels of power but can help to save lives.
- 4. Implement longer-term impact evaluations.** The benefits of rural electrification take time to manifest. Changes in the productivity and quality of clinics also require further investment, such as in working

electric appliances. Community health outcomes and quality of services provided by the clinics will all take time to catch up to improvements in energy infrastructure.

Acknowledgements

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Energy and Economic Growth

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