Powering Healthcare Impact Factsheet

The pathway between health facility electrification and improved health outcomes

The Energy Access – Healthcare Nexus

Electricity underpins nearly every aspect of a **well-functioning health facility** (including blood banks, laboratories, and pharmacies), making it **vital to delivering quality health care**

MEDICAL SERVICES AND LIGHTING

Adequate lighting allows health workers to more safely carry out deliveries, emergency obstetric care and other medical procedures. For example, with sufficient lighting, doctors and midwives can more easily identify and treat hemorrhaging, which is the leading cause of the 289,000 deaths that occur every year from pregnancy- and childbirth-related complications (World Bank, 2014).

MEDICAL COLD CHAIN

Access to reliable electricity is essential for refrigerating vaccines, which save millions of lives each year. The need for cold storage space is expected to rise eightfold in the coming decades as the need to prevent or fight non-communicable diseases through vaccines requires complex interventions that demand additional energy requirements.

HEALTH WORKER SATISFACTION

Health facilities that have access to electricity are better positioned to attract and retain skilled health workers, especially in rural areas, where amenities such as lighting, cooling, entertainment, and communications in staff quarters are highly valued.

FACILITY OPERATIONS AND SAFETY

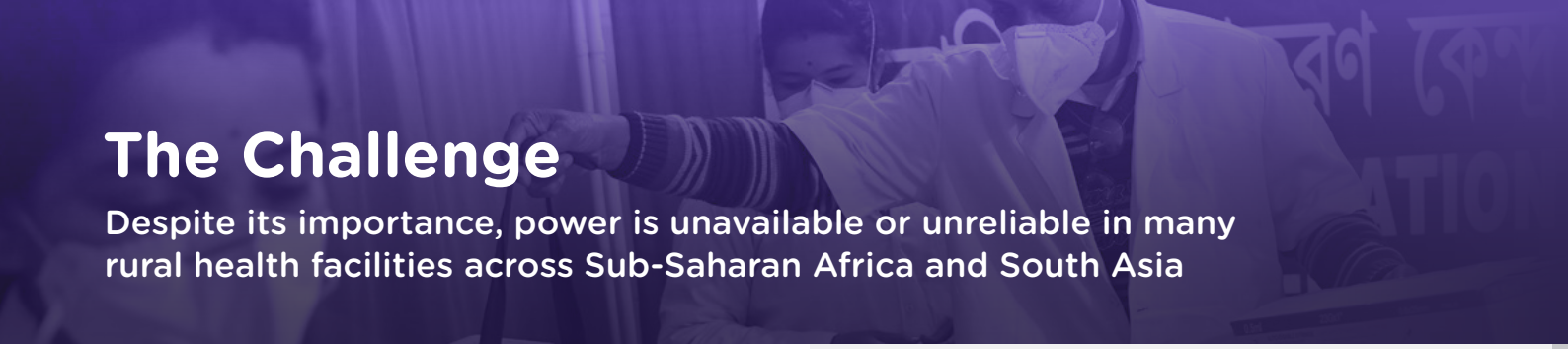
Access to electricity helps extend a facility's hours of operation, which allows medical staff to see a greater number of patients in a day and provide 24-hour emergency medical services. When facilities without electricity do see patients after dark, they often do not have access to many medical devices or lighting and depend on paraffin lamps, candles or torches that provide low quality light, give off harmful fumes and, in some cases, act as fire hazards.

E-HEALTH

Electricity facilitates mobile and telehealth applications, which can improve diagnosis and triage through virtual services. With internet and communication technologies powered with energy access, clinic staff can better communicate in emergency situations, operate and maintain the facility, and track patient records.

WATER, SANITATION AND HYGIENE

Electricity enables water pumping and purification, which are critical to providing adequate water, sanitation and hygiene services and helping prevent and contain infections and disease outbreaks.



The Challenge

Despite its importance, power is unavailable or unreliable in many rural health facilities across Sub-Saharan Africa and South Asia

It is estimated that tens of thousands of health centers across low- and middle-income countries are not connected to the grid and lack electricity, though no comprehensive central inventory on the state of electricity in health facilities currently exists. The prevalence of a lack of reliable energy is especially high in Sub-Saharan Africa, where about one in four health facilities in 11 countries has no access to electricity, and only about one-third of hospitals have reliable electricity access. When health facilities lack access to adequate and reliable power, it jeopardizes the health of hundreds of millions of people, especially women and children who often bear the brunt of inadequate primary health services.

70% of medical devices in the global south do not function and remain unused; nearly a third of equipment failures are **due to power supply problems**

(WHO, 2010)

Almost **60% of health care facilities** in 46 low and middle income countries were found to **have unreliable power** in a study analyzing over 121,000 facilities

(Cronk et al., 2018)

This lack of access to power stems from the fact that many health facilities – particularly those offering primary or community-level services – are in remote areas, characterized by low energy demand and virtually no access to the electricity grid. Cash-crunched governments and utilities find it difficult to justify grid extension to these areas, where revenues are low and the cost of building and maintaining infrastructure is high.

The Solution

Distributed clean energy and efficient medical appliances provide a fast and cost-effective way to power health facilities

The conventional means of electrifying communities by grid extension will not be sufficient to meet SDG7. With a continuation of current policies, 660 million people will be left without electricity in 2030.

Furthermore, being connected to the grid does not always guarantee a steady, reliable access. A World Bank MTF survey of 730 health facilities revealed that 25 percent of on-grid facilities reported outages that affected health service provision (World Bank, 2020). Another common source of power for health facilities in off-grid settings are diesel generators, which are inefficient, emissions-producing, and expensive to maintain.

A study in Bangladesh revealed that the amount spent on diesel fuel in a year to power a backup generator could be used to fund a nurse for six months.

In this context, off-grid solar offers the least-cost option for powering remote off-grid health facilities in most rural areas, especially compared with grid extension and diesel engines. This is thanks to recent cost-declines in solar and battery technology; the price of batteries has dropped 73% (BNEF, 2017) while that of PV modules has decreased by more than 80% since 2009 (IRENA, 2019). When coupled with energy-efficient medical equipment, the cost of off-grid solar solutions can be reduced by an additional 25% (WHO, 2014).

The Impact: Improved Health Outcomes

Powering healthcare can have concrete positive impact on health service provision

SERVICE DELIVERY

- A study in Chhattisgarh, India found that health facilities with solar treated 50% more out-patients each month, conducted 50% higher institutional deliveries, admitted a higher number of in-patients as well as provided round-the-clock services (CEEW, 2017)
- A survey in India found that primary health centers without access to electricity had 64% less deliveries, 39% less in-patients, and 38% less out-patients (Shastry, 2021)
- A study examining the effects of a state rural electrification program in Gujarat, India found the probability of a functioning deep freezer, ice-lined refrigerator, cold box, and vaccine carrier increased significantly by 6.5%, 5.2%, 5.8%, and 6.6%, respectively; probability of a functioning operating table and delivery table increased by 10.3% and 6%, respectively; the probability of receiving a check-up in the first trimester (antenatal care) increased significantly by 9.5% (Chen et al., 2019)
- A program that installed solar systems along with LED lights, small refrigerators, and other equipment in PHCs in the state of Uttarakhand, India, observed a 120-150% increase in the types of disease being treated (IIEC, 2021)
- In a pilot telemedicine project from 2012 to 2014 in Ghana, the teleconsultation centre (TCC) at the district hospital serving 7,500 households received an average of 380 calls a year. 54% of all teleconsultation cases in 2013 were resolved by phone (Smart Villages, 2017)

MATERNAL HEALTH

- A study in Nigeria revealed that the number of working hours for midwives increased by up to 30% with the introduction of the quality-verified solar lanterns (World Bank, 2015)
- A study in Uganda revealed that the availability of midwives and electricity had the highest protective effect on maternal health, by reducing the case fatality rate by 80% and 61%, respectively (Mbonye et al., 2007)
- A study in Uganda found that facilities that were equipped with medical lamps, headlamps, fetal Dopplers, and cell phone chargers had a 9.5% increase in the percentage of essential care actions performed, and a reduction of delays in care by 11.24 minutes (Rokicki et al., 2021)

DIAGNOSIS AND PREVENTATIVE CARE

- In the Lundazi district in Zambia, the acquisition of solar powered microscopes led to a 25-30% increase in the number of people tested for tuberculosis (TB). Testing and treatment of patients in respective clinics have contributed towards the increase in TB cure rate from 62% to 72% in the area (Mfune et al., 2008)
- An estimated 1.5 million people die each year from vaccine-preventable diseases. (GAVI, 2021) Access to modern energy is crucial in the medical cold chain because vaccines must be generally stored under temperatures controlled between 2 and 8 Celsius.

PATIENT AND PROVIDER SATISFACTION

- Electrification of rural health facilities in Ghana and Uganda resulted in health workers satisfaction increasing from 0% in both countries to 100% (Ghana) and 76% (Uganda). The percentage of health workers expressing there was adequate lighting to conduct tasks in the maternal department increased from 2% to 100%, and from 9% to 96%. The percentage of community members satisfied with health facilities increased from 9.6% to 94.7% (Ghana) and from 34% to 95.4% (Uganda). (Javadi et al., 2020) (Case Study)

Case Study: Impact on health worker and community satisfaction

In 2015-2019, the United Nations Foundation (UNF) deployed solar energy solutions in off-grid rural health facilities in Ghana and Uganda. An implementation study was conducted to assess not only the impact of reliable electricity on service delivery, but also its effect on the demand for, utilization of and satisfaction with services. The study found an overall positive impact on service delivery, with statistically significant changes in the availability of 24-hour emergency services and energy dependent equipment such as vaccine refrigerators (Javadi et al., 2020).

The study collected qualitative data through interviews with key informants with health workers, implementing partners, district and local leaders, and focus group discussions with community members. Quantitative data such as health facility checklists and records were adapted from WHO's Service Availability and Readiness Assessment (SARA) tool.

In both countries, there was an increase in health workers' satisfaction with electricity services and self-assessed ability to carry out tasks. This is an important factor in reducing the migration of health care personnel from rural areas. In sub-Saharan Africa, the doctor-to-population ratios range from 1:5,000 to 1:30,000 (Meso et al., 2009), and only 25% of doctors are based in rural areas (WHO, 2006).

TABLE 1: Health workers satisfaction

		Baseline	Endline
Ghana	Satisfaction with electricity services	0%	100%
	Adequate lighting to conduct tasks in maternal department at night	2%	100%
Uganda	Satisfaction with electricity services	0%	76%
	Adequate lighting to conduct tasks in maternal department at night	9%	96%

There was also a significant change in community members' satisfaction with health facilities, especially around nighttime services, safety, cleanliness, and quality of care.

Perhaps influenced by this change in perception, access to reliable electricity seemed to have a multiplier effect on infrastructure enhancement. Community members and local decision makers in both countries noted plans to change resource allocation by building additional structures and supplying facilities with basic energy-dependent equipment. It was also observed that staff in electrified health facilities were more likely to demand equipment from district leaders

The study also identified early and continuous engagement of stakeholders as an important implementation factor for improved outcomes through promoting better understanding of expected project results and community buy-in and participation.

> The electricity is important. Some time ago my child was admitted at Mampong the drip on him was not finished because there was no light. I was even afraid of the unknown when I was sleeping there. So, I told the nurses to discharge us. I went home to sleep and sent him back for care again the next morning. If the light had been there, like is it now, I could have slept there [...]
>
> **(Mother, Ghana).**

TABLE 2: Community members satisfied with health facilities

	Baseline	Endline
Ghana	9.6%	94.7%
Uganda	34%	95.4%

Powering Healthcare and the SDGs

Achieving universal health coverage (SDG 3) means ensuring that everyone has access to quality healthcare, yet not enough attention is given to the critical role of energy in health service delivery especially in the rural, resource-constrained setting. The lack of data on energy access and requirement of health facilities remains a critical, fundamental gap, and improved availability of such data can inform policymakers and project implementors to make better decisions and strengthen the case for increased investment.

Powering health facilities provides an opportunity to not only improve health provision and advance SDG7 targets, but also to contribute to other SDGs, having a multiplier effect:

Reduces vulnerability of populations to climate-related events through ensuring business continuity of health facilities and ensuring sustained access to essential health care in the face of climate-related events

Contributes to universal health coverage, including sexual and reproductive health, through improved health facility functionality

Contributes to the accessibility of WASH services, particularly those that are dependent upon electricity

Promotes decent work, particularly for health workers, by enabling the use of basic services at work, such as light and ventilation

Makes infrastructure (e.g. health facilities) energy resilient in the face of grid failure and potential natural disasters

Can reduce health sector GHG emissions, particularly where clean energy solutions are deployed

Data Priorities for Powering Healthcare

In line with the priorities outlined in the Strategic Roadmap to promote healthier populations through clean and sustainable energy, endorsed by the High-Level Coalition on Health and Energy in the framework of the Health and Energy Platform of Action (HEPA), a set of data-specific priority actions are proposed

1. Increase investment to further explore the pathway between health facility electrification and improved health outcomes in a rigorous, evidence-based way
2. Strengthen commitments from international and national institutions to prioritize health facility electrification as a key policy focus, resulting in the allocation of resources toward nexus-related initiatives and research
3. Improve data availability to establish effective business and financing models for electrification of public institutions in rural and remote areas, with a particular focus on planning long-term and sustainable O&M
4. Implement a standardized monitoring and evaluation framework to track progress and accumulate data on facility electrification, service delivery, and health outcomes at the national and international levels

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Health and Energy Platform of Action

SEforALL's Powering Healthcare programme works with governments and their development partners to achieve universal electrification of health facilities by building the evidence base, developing new ideas, and strengthening sector coordination. For more information, visit seforall.org/powering-healthcare.

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