PREO Powering Renewable Energy Opportunities

CASE STUDY: SUPPORTING EFFICIENT USE OF ENERGY FOR BETTER RURAL HEALTH OUTCOMES

UKaid from the British people

IKEA Foundation

CARBON TRUST

ENERGY4IMPACT ACCELERATING ACCESS TO ENERGY

PUE THEMATIC AREA
Healthcare: electrification of health clinics

GRANT AMOUNT
£227,000

PROJECT LOCATION
Kenya

PROJECT TIMELINE
January 2020 – June 2021

ARA
Afya Research Africa

Afya Research Africa (ARA) is a local organization focused on improving healthcare services in rural communities in Kenya. ARA has been empowering local communities by giving healthcare providers technologies and tools, and researching ways to improve healthcare. ARA operates 27 medical centres across Kenya.

PROJECT SCOPE
ARA is installing solar energy systems in 20 rural health kiosks and 4 public health facilities. These solar systems provide power for ARA's in-house digital health management information systems and their healthcare operations more broadly.

BACKGROUND

Dilapidated infrastructure and poor treatment results are a major problem for healthcare systems in sub-Saharan Africa. Mortality rates are extremely high: in global terms, almost half the deaths of children under five, and two-thirds of maternal deaths, occur in Africa. Lack of energy access is a root cause for such unfavourable outcomes - 1 in 4 health facilities in Africa are not connected to the electricity grid. Hospitals and clinics need electricity to provide quality healthcare for a myriad of reasons, from lighting and heating to refrigeration for vaccines and blood banks.

Decentralised clean energy solutions, coupled with improved energy efficiency, would provide a range of benefits, including a reduction in child mortality rates, an increase in the use of modern medical equipment and improvements in overall clinic operations. However, at present, 26% of Kenya's health facilities have no access to electricity and only 15% have access to stable, reliable power . Access to quality maternity and reproductive services is far lower in rural areas, with a majority of rural women giving birth outside of health facilities, corresponding to a higher neonatal mortality rate . A 2014 study by the World Health Organization (WHO) showed that quality rural healthcare can be attributed to the increased provision of clean energy solutions, often by private entities like Afya Research Africa (ARA).

THE PROBLEM

Communities in rural Kenya, especially expecting mothers and newborns, currently contend with poor healthcare services. In Siaya and Homa Bay, the counties where ARA runs its projects, at least one mother dies in every 196 deliveries, and one in 25 newborn does not survive beyond a year . A high prevalence of HIV in these counties exacerbates these health risks.

The problem stems from a shortage of healthcare providers in rural areas, but it is also intensified by inadequate electricity supplies, geographical and financial constraints, and poor management of information. The latter is exacerbated by the use of manual health information systems due to the lack of electricity access. Robust digital health information systems are critical for healthcare. The systems must be efficient enough to identify individuals, track care access and data between facilities, and support accurate reporting to central health data repositories. Yet in Kenya, most health information systems are still paper-based. Targeted care is challenging, and the health system takes little account of different diseases happening simultaneously. Data systems are not linked effectively. As a result, disease treatment and management are often poorly organised.

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THE PROPOSED SOLUTION

ARA is working on 3 complementary areas to improve healthcare: provision of care, locally relevant health technology, and an evidence base for best practices. The project assesses whether regularly available alternative energy at community and referral health facilities leads to increased access to quality mother and newborn healthcare.

In healthcare centres in Siaya and Homa Bay, which are either completely off-grid or in areas with unreliable grid connection, ARA has installed 100Wp-200Wp solar systems with battery storage to power basic appliances for healthcare delivery. The kiosks have acquired electrical and medical equipment like lights, fridges, haemoglobin machines, centrifuges, autoclaves for sterilising equipment, servers and monitors. Furthermore, ARA installed an in-house information management system (STONE®HMIS). This integrates patient data across all 20 Ubuntu-Afya kiosks and 4 public healthcare facilities to which the kiosks refer patients. STONE®HMIS addresses broken health records and data systems, healthcare access challenges, client loss to follow up, clinical protocol non-compliance, and accountability issues.

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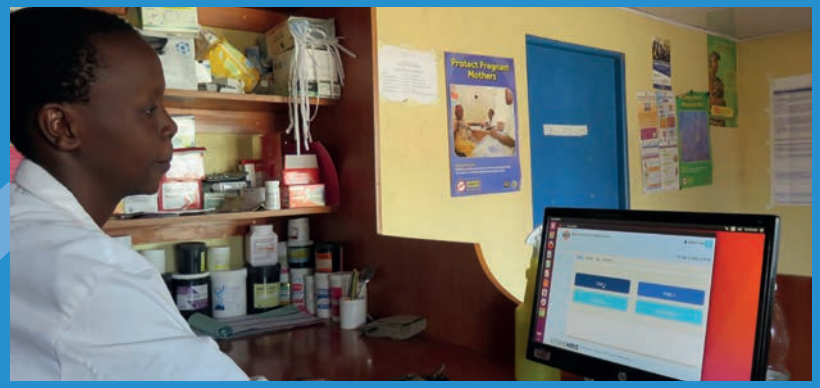

PRELIMINARY RESULTS

- **Extended opening hours** at healthcare centres. Off-grid facilities can now run on full power for at least **8 hours a day**, having previously received just 1-2 hours of unreliable power. Grid-connected facilities get about **4 extra hours** of power daily and can now operate on full power for at least 12 hours a day. This allows community members to visit facilities during non-working hours, typically after 6pm, and keeps essential equipment powered throughout the day. Patients are more confident about visiting health facilities after dark, and health workers can provide emergency services at night.
- **Cost savings** of approximately **£1,200** since January 2020. This is due to the switch from energy sources such as LPG fuel, saving transport costs to purchase fuel and collect vaccines from the nearest electrified health facility, and a reduced need to pay to use machines from other facilities.
- **9 temporary jobs** were created by the solar installation process.
- **Increased numbers of patients** visiting healthcare centres, from **1,600** to over **3,000** per month, **59% of whom are women**. This is due to 3 main factors: the clinics are located much closer to the communities, making it easier for patients to visit even at night; sufficient power enables a wider range of services, including diagnosing diseases like malaria and pneumonia, plus extensive maternal care even at night; and the community is more confident in ARA's service due to the STONE® HMIS systems' more efficient administration and record-keeping. Since January, ARA has delivered **107 newborns**, nearly twice as many as the year before
- **Time savings** from the STONE® HMIS system, which aids in faster retrieval of patient information, better flow of information between facilities, and more efficient administration.
- **Additional medical appliances** became operational. For example, the switch to digital blood pressure machines has greatly improved the accuracy of blood pressure data.

> *"Before, we were forced to refer patients, including women in labour, to other hospitals during blackouts. Solar power enables us to work around the clock without putting patients at risk or worrying about the expensive equipment repairs caused by sudden power surge."*
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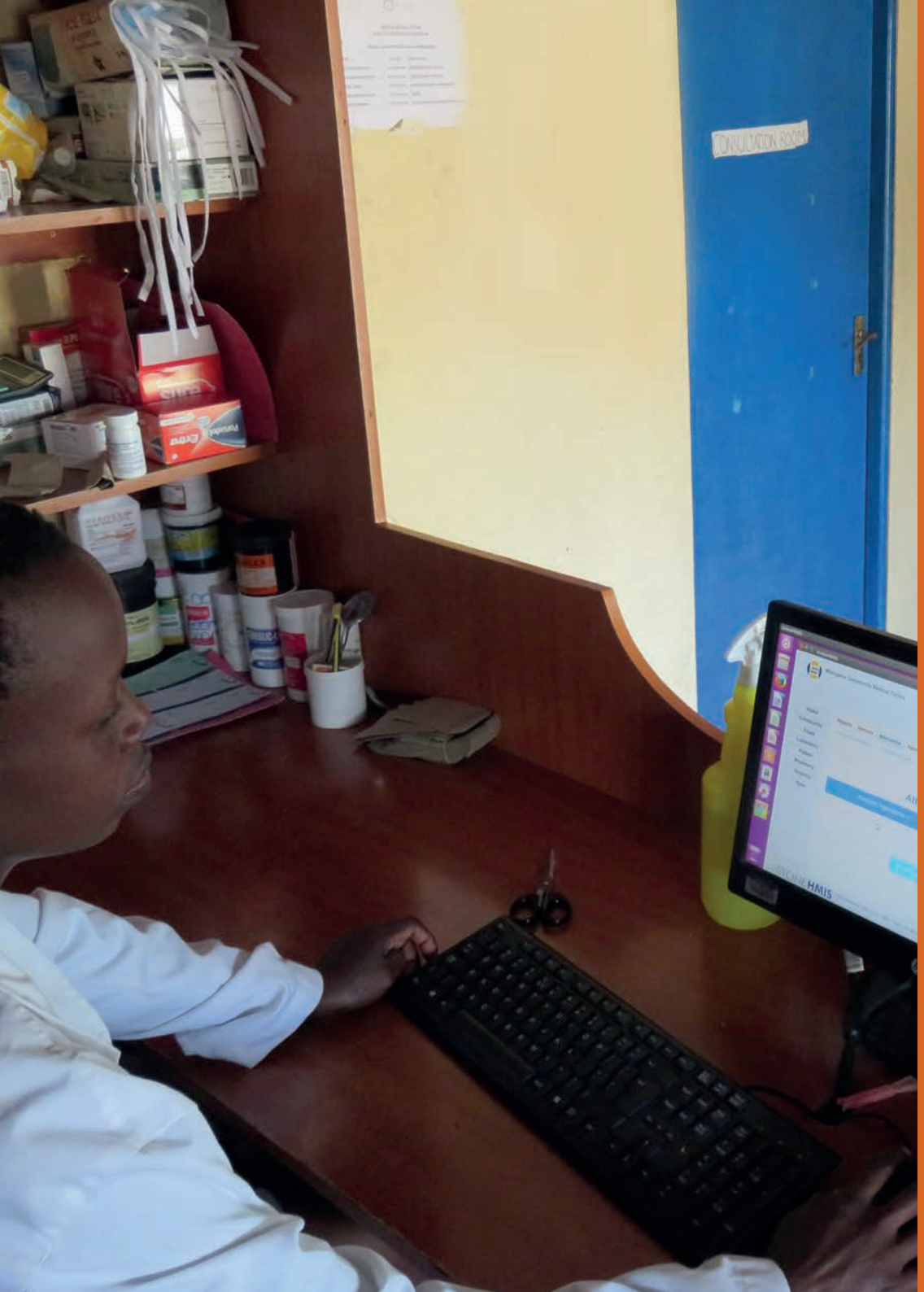
> *Nurse at Madiany Sub-County Hospital.*



LESSONS LEARNED

- It takes time for staff to adapt to a new information management system, especially as staff typically have limited IT skills. ARA provides monthly training on the STONE® HMIS system to staff at the Afya clinics and the referral public health facilities. The system must also be installed in referral facilities to improve communication between facilities; its use by referral facilities depends on their internal policies and availability of resources to roll-out the system.
- It is easier and more cost-effective to work with engineering or technical partners during procurement, installation and commissioning of solar systems. Telefirms, a local engineering company, aids ARA in their sizing, procurement, transportation and installation. Telefirms also provides training to staff on operating solar systems and basic troubleshooting, and carries out check-ups in the first 9 months of the project.
- Providing solar systems has been challenging during COVID-19. ARA has installed solar systems in all kiosks and referral public health facilities, but so far has only commissioned them in the kiosks, as testing and training had to be delayed due to restrictions for travels and gatherings. The STONE® HMIS systems can run on existing grid power, but supply is unreliable.
- COVID-19-related safety restrictions hinders community engagement and data collection. Before March, ARA conducted door-to-door visits and community meetings to promote the clinics' increased power supply and collect data on community needs. Health workers carried out home visits. Due to COVID-19, ARA has significantly reduced field activity, now reserving home visits for expectant mothers and children below 9 months on a needs basis. ARA wants to try collecting field data by phone or through health workers residing in their communities.

MOVING FORWARD

ARA will continue monitoring clinical services and results on a monthly basis. They aim to treat at least 7,000 more patients through their Afya kiosks, 65% of whom will be women, and to reduce OPEX by 20% by June 2021, which they believe they can achieve due to savings on 1) traditional energy sources like diesel generators for powering machines and LPG gas for refrigeration, 2) associated transport costs to get these fuels, and 3) costs associated with repairing equipment damaged by power surges to health facilities connected to unreliable grid. They hope to attract at least 2 investments to improve their business model and expand beyond Siaya and Homa Bay. ARA also plans to produce two knowledge pieces: one on best practices in rolling out a health management information system and one on the impact of solar power on healthcare.

> *The solar system has ensured there are no disruptions in power supply. Our computer system relies on it, and so do the vaccine refrigerator and life-saving medical equipment.*
>
> *MoH Rachuonyo Sub-County Hospital.*

1. WHO, 2000 – 2017: www.who.int/reproductivehealth/maternal-mortality-2000-2017/en/
2. Based on a 2010 study by Aidan-Rohani, H et. al. See: www.researchgate.net/publication/266573662_Limited_electricity_access_in_health_facilities_of_sub-Saharan_Africa_A_systematic_review_of_data_on_electricity_access_sources_and_reliability. See also WHO's 2015 report on access to modern energy services for health centres: https://apps.who.int/iris/bitstream/handle/10665/156847/9789241507646_eng.pdf;sequence=1
3. Kenya National Bureau of Statistics, 2017
4. KDHS 2014
5. System commissioning refers to carrying our physical and technical tests to ensure that the system is structurally and electrically safe, and that it operates inline with design parameters. Tested areas include performance against resistive loads, solar power production under full sun, effectiveness of the data-logging system, control and automation testing, and battery testing.

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