

**ENERGY
CATALYST**

Market Guide: Health

June 2020



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Promoting health and well-being is the 3rd Goal of the 17 United Nations Global Goals that make up the 2030 Agenda for Sustainable Development. The global community has made significant strides against several leading causes of death and disease. According to a report by the World Health Organization (WHO), overall life expectancy has increased dramatically in the last decade, infant and maternal mortality rates have declined and, the number of HIV and malaria related deaths have decreased by 50%.



Despite the progress made in the last decade, at least 400 million people have no basic healthcare and more than 1.6 billion people live in countries with weak national capacities to deliver basic health services. Sustainable development of communities is affected by the well-being of its inhabitants, which is often predetermined by the type of energy used and the availability of electrified health facilities. Unfortunately, energy poverty remains one of the barriers to improved healthcare, with 60% of low and middle income countries lacking access to reliable electricity in health facilities. Moreover, lack of access to clean fuels and technologies for cooking damages the health of three billion people and accelerates deaths caused by indoor air pollution.

This market guide has been developed for new and existing renewable energy companies looking to operate in the health sector in Africa and Southern Asia. It aims to provide a broad overview of basic concepts, challenges and opportunities in the healthcare market.

The guide has been designed to address various elements that should be considered during the commercialisation process, with the aim of maximising the impact of companies participating in the health industry in identified regions. The key elements will focus on:

- Identified delivery models that contribute or hinder sustainability in different regions
- The public and private sector designs for off-grid projects for health facilities
- Current and past initiatives or case studies from existing key players to provide key learnings

Given the unique features of projects and country policies, rules and regulations, this guide does not seek to prescribe solutions for success, but rather offer basic design principles and best practices for effective decision making.

Sector background

The overall national healthcare systems are based on the three-tier system of primary, secondary and tertiary healthcare. Primary healthcare is a whole-of-society approach to health and well-being centred on the needs and preferences of individuals, families and communities. It addresses the broader determinants of health and focuses on the comprehensive and interrelated aspects of physical, mental and social health and well-being. Secondary health care is specialist treatment and support provided by doctors and other health professionals to referral patients for specific expert care, most often provided in hospitals. Tertiary care involves highly specialised staff and technical equipment such as cardiology, intensive care units, specialised imaging units and clinical services highly differentiated by function.

According to the World Health Organization (WHO), delivery of healthcare entails strengthening the following six pillars:

- health workforce
- service delivery
- health information systems
- access to essential medicine
- financing
- leadership and governance

The underlying challenges cutting across the six pillars are lack of adequate funding and access to reliable power, which continue to hamper the efforts to achieve Universal Health Coverage (UHC), particularly in low-income countries in Africa and some parts of Asia.

Healthcare systems in Africa mostly exist in unworkable conditions with very poor infrastructure and health outcomes. 25% of clinics and hospitals serving approximately 255 million people have no electricity. With less than 1% of global health expenditure and only 3% of the world's health workers, Africa accounts for almost half the world's deaths of children under five, has the highest maternal mortality rate, and bears a heavy toll from HIV/AIDS, tuberculosis, and malaria.

Lack of reliable electricity in health facilities that do have power continue to face challenges relating to lighting, refrigeration, sterilisation and communications. This means limited availability of life-saving care affecting heating, cold-chain vaccine storage, blood banking, ventilation and cooling systems, as well as ICT services. As disease patterns change, more energy is required to expand services for prevention and treatment of non-communicable diseases (NCDs).

Decentralised renewable energy solutions, coupled with energy efficiency measures have great potential to improve healthcare infrastructure, increase safe deliveries, reduce mortality rates, increase use of modern medical equipment to make accurate diagnoses and conduct routine childhood immunisation. Lighting and communication in health facilities could also increase night-time care services, reduce operational costs and incorporate use of ICT for proper patient documentation.

In Uganda, about 15% of hospitals use PV solar to complement grid electricity access; in Sierra Leone, 36% of all health facilities and 43% of hospitals use solar systems in combination with other electricity sources. In Liberia, which little on-grid power beyond its capital city, the pace of solar electrification has outstripped that of other power sources.

In most countries in Southeast Asia, there is both a rapidly aging population and the increasing burden of patients with chronic conditions. Although some efforts to integrate primary and hospital care are underway, overall care delivery remains fragmented and diverse in terms of medical electronic record sharing, patient registries, and empowerment of primary health workers to handle chronic illnesses. There also exists a disparity in access and quality of healthcare between urban and rural areas. The

Insights

- Programmes and service delivery mechanisms aimed at strengthening health systems will need to offer novel and sustainable solutions to address gaps in accessing quality primary care, basic diagnostic tests, and essential medications in rural communities
- There's a need for new care models and technologies that address the drivers of health, enable early diagnosis, and monitor response to treatment
- The use of mobile and wireless technologies to support the achievement of health objectives has the potential to transform the face of health service delivery models
- In Southeast Asia's emerging markets, infrastructure gaps remain a major impediment to telemedicine, but as connectivity improves, many new telemedicine services are getting funding and traction

rising rates of non-communicable diseases are driving demand for greater healthcare services and infrastructure.

In 2019, however, Southeast Asia recorded a total of USD \$226 million in telemedicine investments, with Singapore and Indonesia scoring about 93% of the total funding value. Lack of access to health care facilities has seen a rise in online platforms providing remote health services to underserved populations. Investments in health tech have also led to development of advanced information systems to enable the aggregation of patient data to help eliminate medical mistakes and errors.

In Thailand, hospitals and public healthcare facilities are spending at least one-third of their allocated annual budget on electricity bills. To ease the burden, the government is looking to implement a new model that will place importance on energy self-reliance in healthcare facilities. In 2019, it launched a crowdfunding campaign to install PV systems in seven hospitals in the Northern region.

Despite notable improvements in its health sector, people in South Asia have continued to experience the unequal distribution of progress. The region's healthcare is still characterised by reduced life expectancy (though on an upward trajectory in India), high maternal and child mortality, and gender discrimination. The region's public health services remain too fragmented, under-financed, and over-burdened to meet the needs of the majority of the population.

In India, the Council on Energy, Environment and Water (CEEW) reported a significant improvement in performance in public facilities with solar compared to those without. On average, health facilities with solar treated 50% more out-patients each month, conducted 50% higher institutional deliveries, admitted a higher number of in-patients and provided round the clock services. Staff from the health centres had positive perceptions of such systems with about 98% of staff reporting lower disruptions in day-to-day functioning, and 80% reported savings in electricity costs.

Clean cooking

The use of open fires and solid fuels for cooking is one of the world's most pressing health and environmental problems, directly impacting close to half the world's population and causing nearly four million premature deaths each year, with 50% being children under the age of five. Women and children are disproportionately affected by this massive global challenge, suffering from toxic smoke, time poverty, and the consequences of deteriorating natural environments.

The Clean Cooking Alliance is leading global efforts to reduce economic and climate risks while protecting the health of women and children. It seeks to mobilise high-level national and donor commitments toward the goal of universal adoption of clean cookstoves and fuels.

The World Bank's Energy Sector Management Assistance Program (ESMAP) has also established a planned USD \$500 million Clean Cooking Fund (CCF) to accelerate progress towards universal access to clean cooking by 2030.

According to the International Energy Agency (IEA), nearly 3 billion people in the world lack access to clean cooking facilities, with 1.7 billion based in Asia and 657 million in Africa, who rely solely on biomass, kerosene or coal as their primary cooking fuel, particularly in rural areas.

Despite the high numbers, both regions have made significant progress since the turn of the century (2000 - 2016, IEA). In India, 80 million free LPG connections have been provided to poor households, reducing reliance on 'dirty' fuels by 10%. In West Africa, three million people gain access to clean fuels and clean cooking technologies every year, and 1.5 million in East Africa each year. Access to clean cooking remains much higher in urban areas, where 83% have access compared to 32% in rural areas.

WHO and UNDP, together with other key stakeholders such as the World Bank, IRENA, Sustainable Energy for All (SE4All), the UN Foundation and the Clean Cooking Alliance are currently building the Health and Energy Platform for Action (HEPA), a mechanism for enhancing cooperation among health and energy actors with a focus on accelerating adoption of clean cooking technologies and electrifying health facilities with renewable energy.

Rapid deployment of clean cooking fuels and technologies has, however, not received adequate attention from policy makers, and continues to lag behind the rate of electrification. High entry costs, lack of consumer awareness of the benefits, financing gaps for producers, slow progress in development of cookstove models and fuel production solutions continue to exacerbate uptake challenges.

More information on clean cooking solutions can be found in the technology guide on this topic.

COVID-19 pandemic

Humanity is facing an unprecedented global health emergency due to the outbreak of COVID-19. As the virus continues to spread, governments are putting in place measures to limit humanitarian and economic losses.

The World Bank has developed a set of emergency support operations for developing countries around the world. It is preparing to deploy up to \$160 billion over the next 15 months to support COVID-19 measures that will help countries respond to the immediate health consequences of the pandemic and bolster economic recovery.

It is also responding to widespread supply chain disruptions by helping countries access critically needed medical supplies by reaching out to suppliers on behalf of governments.

The initial projects approved include:

- Ethiopia: \$82 million budget for COVID preparedness and response, provision of vital medical equipment, health system capacity-building, and support to establish treatment centres
- Democratic Republic of Congo: \$47 million budget to provide support to put in place containment strategies, train medical staff and provide equipment to ensure rapid case detection and contact tracing
- Cambodia: \$20 million budget to establish laboratories, isolation and treatment centres in 25 provincial referral hospitals and equip them with essential medical and testing supplies
- India: \$1 billion budget in emergency financing to support better screening, contact tracing, and laboratory diagnostics, to procure personal protective equipment, and to set up new isolation wards

The International Finance Corporation (IFC) is providing \$8 billion in financing to private companies affected by the pandemic. It will deploy a pipeline of about 300 companies across emerging markets to shore up private sector activity.

Its engagements include extending trade finance and working capital lines to partner financial institutions, as well as supporting existing clients in the infrastructure, manufacturing, agriculture and services industries that are vulnerable to the pandemic.

Possible COVID Trends

- Governments might struggle to handle the crisis alone, which will see a surge of public-private partnerships emerging as companies are called on to be part of the global solution
- The pandemic becomes a prolonged crisis as waves of disease rock the globe for longer than predicted
- China and other East Asian countries manage the disease more effectively and emerge from the recovery period with less economic impact
- Countries are considering issuing 'Immunity Passports' to recovered COVID patients

The course of the pandemic's impact in the medium and long term remains uncertain. There are currently no clear recovery patterns or data to show how current lockdowns will impact rural livelihoods. Efforts to collect and analyse such data will go a long way in helping craft domestic narratives and counter-narratives of socio-economic transformation, and possibly establish reality-based policymaking.

Energy security is still a major area of attention and the crisis highlights the critical value of electricity infrastructure and know-how, underpinning responses to COVID-19. By making the transition to renewable energy an integral part of the wider recovery from the pandemic, governments could achieve energy-focused global targets for different sectors, particularly health.

It is still too early to tell whether there will be a second wave of the virus, however, given the history of previous pandemics, governments, global agencies as well as the private sector should plan for a possible outbreak beyond the predicted period.

Private sector

The private sector in the health industry encompasses a diverse range of non-state players such as multinational corporations, non-governmental organisations, private institutions, faith-based organisations, independent informal and formal practitioners, charitable hospitals, corporate hospital chains and diagnostic centres, as well as civil society.

There has been recognition of the importance of partnership among governments and the private sector in advancing UHC in countries from both regions. Public-Private Partnerships (PPPs) in the health sector are increasingly perceived as a key approach to delivering healthcare services. These partnerships are likely to:

- Increase the level of financial resources committed to public services such as primary healthcare, and provide better value for money
- Allow governments to focus on functions they have comparative advantages in, while the private sector is in charge of service delivery
- Allow for greater innovation by focusing on outputs and outcomes rather than processes

When developing a partnership that aims to serve public health facilities, first look into the different categorisation of facilities in the country where the project will take place. This can be informed by hospital bed capacity, location, energy requirements, and the type of medical equipment and communication devices in use.

Maximising awareness and involvement of the beneficiary communities early in the assessment phase is vital. Key activities such as promotional programmes, regular meetings with community leaders and focus-group meetings will play an important role in determining the success and acceptance of a project in a community. Special considerations or desired operational characteristics of the system such as resource availability, practical issues of deployment or operation, or risks and hazards associated with the equipment should be identified when conducting community engagement activities.

PV panels are the most expensive part of a solar electric system; as such, they are sometimes targets for theft. Private partners should ensure health clinics have good security measures in place. The cost of a PV system depends on the size. However, unusual expenses such as transportation of modules, customs fees, or permitting expenses can increase this cost.

The delivery mechanism or business model selected should ensure that service providers and end-users have access to quality products and services at affordable prices, access to qualified repair services and spare parts over the long term, and should benefit key actors along the value chain during and after the implementation of the project.

Private partners should consider factors that would increase the likelihood of sustainable off-grid electrification projects. For example, projects should be consistent with a country's rural electrification plans and health infrastructure for the regions identified. This will inform the project's long-term sustainability roadmap to ensure long-term impacts.

Creation of partnerships that play to the technical and administrative strengths of each partner ensure a project's tasks and roles are assigned to the most qualified partner with the capacity and expertise to implement an off-grid project.

To guide the delivery of off-grid projects, private partners should work closely with public sector representatives or ministries of health and energy during planning and implementation phases of the project.

Design and preparation of electrification projects for health facilities entail gauging their energy demand, assessing the type of inventory or equipment used at the health facility, understanding alternative energy options available onsite and selecting an energy solution influenced by the size of institution, the category that the health facility falls under, and the geographical location.

In grid-connected areas, "feed-in" tariffs can facilitate the sale of surplus electricity produced on-site by a health facility to the grid. Other forms of incentives can make energy efficiency investments more attractive.

The development of remote monitoring tools, stakeholder training curriculums and activities are components that should be included at multiple levels of the project to encourage a sense of ownership among stakeholders. A user manual guide should be developed, especially for institutions with a high staff turnover.

Improved measurement and monitoring of energy supplies should yield data on whether facilities have sufficient power capacity to run all critical support functions, such as lighting, water pumping and powering appliances during all working hours, while maintaining stable voltage and without significant power outages.

Business models that encourage productive activities resulting from clinic electrification projects improve lives and livelihood opportunities to those who cannot afford individual household connections or systems. Such activities increase the economic attractiveness of the project not only for the health facility but the community as well.

Insights

- Out-of-pocket healthcare spending is projected to fall as healthcare coverage expands. This calls for understanding how payers define value to help tailor products to meet the demands of cost-conscious payers.
- International and regional economic integration initiatives in South-East Asia are likely to improve local market access conditions that will enable foreign healthcare companies to compete more successfully.
- Private sector needs to create partnerships to establish connections with insurance companies and deeply fragmented pharmaceutical industry.
- Tapping into South-East Asia's healthcare market requires understanding the vast economic, socio-demographic and political differences in the countries that make up this region.

Operations and Maintenance (O&M) costs of the system could be catered for by revenue generated from Income Generating Activities (IGAs) such as photocopying and printing services or mobile phone charging for residents within the community. Training could be provided during deployment to help staff identify the most suitable IGAs which will not supersede or compete with the medical needs of patients. Since operational costs of health clinics are met by the government, the institutions might not have a need for IGAs, but they are likely to experience disbursement delays which could restrict timely, preventative or curative diagnosis for the energy systems.

The project implementers should also ensure beneficiaries use energy-efficient equipment and good employee management practices to avoid system downtime or failure.

Provision of energy services should also be extended to facilities within the health facility that cater to staff and non-staff electricity needs, that is, in staff housing, kitchen and storage facilities to increase staff retention rates as well as the use of clean cooking products.

Sector trends

The key trends identified in South Asia and Africa's health sector identified between 2019 and 2020 include:

- Solar power is increasingly being used as an affordable alternative to diesel-powered generators. There have also been advances in the use of hybrid technologies.
- Energy initiatives in health facilities may range from standalone off-grid and micro-grid solutions using a mix of renewable and/or fossil fuel-based technologies to large-scale grid expansion around centralised power plants.
- Investors are looking beyond support for health facilities alone; their focus will expand to include new categories of assets in out-of-hospital care.
- Microfinance institutions and off-grid solar companies are emerging as clean cooking distribution channels.
- Clean cooking sector investment is growing, but is still insignificant due to relatively unproven scalability.
- Business models that integrate fuel sales from products such as pellets with gasifier stoves, ethanol and pay-as-you-go liquefied petroleum gas in the clean cooking industry are gaining increased private sector attention.
- Increased recognition of the importance of digital technology and government leadership to reduce barriers to entry and implementation.
- Governments, donors, and implementing organisations are recognising the importance of integration and interoperability, to allow for digital programmes to transfer and retrieve information across systems.
- A shift from Universal Health Coverage towards improving systems and operations: government efforts in low income countries in Asia are expected to shift from big political moves in universal health coverage to double down on digital solutions and technology to overcome systemic barriers and enhance operations.
- Deepening of payer-provider relationships: the creation of new models of collaboration is expected as the sector moves away from traditional fee-for-service models.
- Improving diagnostics services through public-private partnerships: leverages both sectors' capacities to purchase modern diagnostic equipment or attract specialist technicians to manage the equipment and administer complex scans.
- Expanding health coverage: African governments are looking to the private sector to incorporate technology that consolidates networks of health extended service providers.

Sector challenges and opportunities

Table 1 Challenges in the health sector in Africa and Southern Asia

Challenge	Mitigation
<ul style="list-style-type: none"> The health markets in developing countries are usually at different stages of maturity, so a solution that works well in one market may not necessarily be replicated or scaled in a different market and will have to be tailored to the said market 	<ul style="list-style-type: none"> Knowledge sharing with other industry stakeholders helps identify sustainable ways to evolve and scale
<ul style="list-style-type: none"> Poor infrastructure can delay electrification and wiring of buildings such as wards, laboratories, administration blocks and other facilities in the health clinic 	<ul style="list-style-type: none"> Initial assessment to determine the extent of the problem, solutions and time taken to rehabilitate the buildings
<ul style="list-style-type: none"> Health clinic categorisation determines the health services a clinic can provide, so power installed might not be fully utilised or might need upgrading to a system with a higher capacity 	<ul style="list-style-type: none"> Proper system sizing that matches clinics' current and projected energy demands
<ul style="list-style-type: none"> Delayed funding in public health clinics for purchasing medical equipment 	<ul style="list-style-type: none"> Case by case basis varying from one country to another - depends on decision making procedures in governments
<ul style="list-style-type: none"> The total load of equipment connected might exceed the capacity of the system 	<ul style="list-style-type: none"> Assessment should be based on current and projected energy demand at the institution for proper system sizing.
<ul style="list-style-type: none"> Malfunctioning of remote monitoring systems, which will limit the frequency of transmission of data on energy produced and consumed 	<ul style="list-style-type: none"> Hardware inspection and pilot testing of the remote monitoring systems to identify problems before system installation
<ul style="list-style-type: none"> Health clinics based in extremely remote locations with poor or no network eliminate the use of remote monitoring systems to collect data on system functionality and usage 	<ul style="list-style-type: none"> Include a budget for site visits for system inspection at such health clinics
<ul style="list-style-type: none"> Electricity usage in staff facilities might deplete the energy needed when serving patients 	<ul style="list-style-type: none"> Train stakeholders on how to manage usage during different times of the day and night
<ul style="list-style-type: none"> Re-training new staff at health facilities due to mandatory staff transfers by the government. 	<ul style="list-style-type: none"> Develop a user manual guide and allocate a budget to carry out training throughout the cycle of the project
<ul style="list-style-type: none"> No budget allocations for Operations and Maintenance (O&M) of the system in public health clinics 	<ul style="list-style-type: none"> Introduce Income Generating Activities (IGAs) to raise money to cater for O&M activities
<ul style="list-style-type: none"> Certain parts of the system such as invertors are not available locally 	<ul style="list-style-type: none"> Minimise cases of system failure by frequently carrying out preventative maintenance of systems
<ul style="list-style-type: none"> Shortage of technically qualified medical staff and instructors 	<ul style="list-style-type: none"> Provide rigorous user training to staff throughout the cycle of the project
<ul style="list-style-type: none"> Structuring Public-Private Partnership (PPPs) arrangements with countries where the enabling environment for PPPs is weak and the legal and regulatory framework is not advanced poses challenges in project deployment and implementation 	<ul style="list-style-type: none"> The World Bank offers capacity building to such countries to strengthen their ability to assess the merits of the PPPs

<ul style="list-style-type: none"> Health PPPs can exhibit considerable complexity, particularly in the clinical operation of those facilities 	<ul style="list-style-type: none"> Short-term arrangement contracts are lower risk for the delivery of narrowly defined health services
<ul style="list-style-type: none"> Risks of designing excessively long programmes delivered in often underutilised facilities 	<ul style="list-style-type: none"> Seek advisory services and expertise on project design and management before implementation
<ul style="list-style-type: none"> Corruption and bureaucracy in respective government offices might lead to delays in project implementation 	<ul style="list-style-type: none"> Case by case basis varying from one country to another within the African and Asian regions
<ul style="list-style-type: none"> Highly fragmented pharmaceutical sector in some of the countries within the African and Asian regions 	<ul style="list-style-type: none"> Research on specific country regulations, frameworks and sector players and their roles

Table 2 Opportunities in the health sector in Africa and Southern Asia

Opportunity

Telemedicine (mHealth)

Explore provision of mHealth Services such as prevention services, treatment services, diagnosis service, monitoring services, wellness services, strengthening solutions and healthcare systems

Pharmaceutical sector

There are opportunities for pharmacies to adopt mHealth to sell medical products to a wider market in both rural and urban areas

Partnerships

Form strategic partnerships or value-add partnerships to build cooperative and sustainable business models within the sector, e.g. clean cooking, water sanitation

Create partnerships with financial institutions to provide credit for purchasing high investment clean technologies

Immunisation supply and logistics systems

Vaccine products and packaging

Use of solar energy for vaccine storage and handling

Immunisation supply system efficiency

Environmental impact of immunisation supply systems

Immunisation information systems

Human resources for immunisation logistics

Improved access to capital

Educating local banks about the true risk profile of the health care sector

Using international financial backing to encourage local financial institutions to lend to healthcare enterprises

Cold Chain Storage

Development of a cold chain facility at health facilities

Capacity Building

Provide capacity building training on setting up Income Generating Activities (IGA) to utilise energy from systems installed

Investment opportunities

The investment opportunities in both sectors for the next five years have been identified by various research companies, which have developed knowledge products sold at a fee ranging between \$2,000 and \$8,000 depending on the type of user and volume of information. However, the estimated value of potential investment opportunities in the health and clean cooking sector is approximately \$8.79 billion. The value of investments in the health sector has been derived from the number of people served by health facilities with no or unreliable electricity, bed capacity for clinics under different categories and the sizes of PV system likely to meet facilities' energy demands (see Table 3). For the clean cooking sector, the value of investments has been derived from the number of people without access to clean cooking equipment or products, the average family size and the average retail price of an Improved Cook Stove (ICS) or LPG (see Table 4). The retail price of other clean cooking products has not been accounted for in the calculation.

Assumptions: 55% of the health facilities in rural areas have a bed capacity of 0 to 60 and 45%, 60 to 120.

Table 3 Investment opportunities in the health sector in Africa and Southern Asia

Region	No. of clinics/ 1000 people	Clinics/bed capacity		PV system Installed		Investment (USD)
		0 - 60*	60 - 120**	2kW*	4kW**	
Africa	0.25 M	0.14 M	0.11 M	\$5,000	\$8,000	1.58 B
South and S/East Asia	0.23 M	0.13 M	0.10 M			1.45 B
Total Potential Investment – Solar PVs in Off-grid Health Facilities						3.03 B

Table 4 Investment opportunities in the clean cooking sector in Africa and Southern Asia

Region	People without access to clean cooking	Avg. Family Size	Avg. No. of households	Avg. price of ICS or LPG (USD)	Investment (USD)
Africa	675 M	4.45	142 M	\$11	1.56 B
South and S/East Asia	1.7 B	4.75	382 M		4.20 B
Total Potential Investment – Clean Cooking					5.76 B

Table 5 Overview of the key players in the health sector in Africa and Southern Asia

NGOs/Foundation	Pharmacies	Funding/Global Agencies	mHealth	Other
Amref Health Africa Aid for Africa Africare Rural Healthcare Foundation AIDS Healthcare Foundation (AHF) AIDS Healthcare Foundation (AHF) Wellcome Trust UN Foundation Bill and Melinda Gates Foundation Foundation for the National Institutes of Health (FNIH) UNAIDS	Goodlife Pharmacy Pharmacy Pharmarack MPharma HealthPlus Sun Pharmaceutical Eco Pharmaceuticals MyDawa (online pharmacy)	African Development Bank Asian Development Bank The World Bank The World Health Organisation The Global Fund to Fight AIDS, Tuberculosis and Malaria Clean Cooking Alliance	DoctorOnCall Ping An Good Doctor Doc Doc Leap	The Global Health Network Institute for Health Metrics and Evaluation Planetary Health Alliance

Case studies

Case Study 1: Vaccine supply chain innovations in Africa, Southeast Asia and Central America

Project Optimize was a five-year collaboration between the World Health Organization (WHO) and PATH which partnered with Ministries of Health in Vietnam, Senegal, Tunisia, Albania and Guatemala to identify ways in which immunisation supply chains can be optimised to meet the demands of an increasingly large and costly portfolio of vaccines.

The overarching goal was to generate momentum to move the immunisation world closer to an ideal vaccine supply chain that supports stronger, more adaptable, and more efficient logistics systems, extending the reach of lifesaving health technologies to people around the world.

The project aimed to implement new immunisation information systems and vaccine supply chains for improved logistics and sustainability. It comprised of the following activities:

- Use solar energy and energy efficiency measures to reduce the environmental impact of supply storage and transport
- Test a comprehensive renewable power system along the entire vaccine supply chain
- Integrate the supply chain system into one chain of refrigeration and delivery
- Implement a networked digital supply information system to improve tracking of vaccine distribution

Key Learnings:

- Investment in information systems can help strengthen national public health systems. However, project implementers must make a convincing case to health ministries that already have limited resources with competing priorities in order to achieve investment.
- Keeping heat-sensitive vaccines at the right temperature is crucial, yet often difficult in areas with limited or no electrical power. Project Optimize collaborated with the Vietnam National Expanded Programme on Immunization to evaluate two technologies to respond to this challenge.
- Both cold boxes and vaccine carriers require conditioned ice packs or cold-water packs to keep vaccines cool.
- Solar energy is a promising solution for powering the storage and transportation of vaccines and heat-sensitive drugs at controlled temperatures, as many health facilities in remote areas operate without grid electricity or have unreliable and costly electricity.

Case Study 2: Powering primary healthcare through solar in India

Chhattisgarh Renewable Energy Development Agency (CREDA), in collaboration with the Chhattisgarh Health Department, installed off-grid solar photo-voltaic (PV) systems of 2 kW each starting in 2012. Although Chhattisgarh is a power-surplus state, only 66% of PHCs have a regular power supply.

In 2017, the Council on Energy, Environment and Water CEEW, one of South Asia's leading not-for-profit policy research institutions, conducted an evaluation on the Chhattisgarh project to assess the impact of the installation of solar PV systems on improving access to electricity at the PHCs, and thereby improving health service delivery. The evaluation was intended to:

- Understand the relation between electricity access and delivery of healthcare services
- Evaluate the impact of installed solar PV systems on addressing gaps in access to electricity
- Assess the gaps in the transition to higher standards of primary healthcare in Chhattisgarh

A comprehensive questionnaire on health and energy was administered to a total of 147 PHCs (83 solar and 64 non-solar) in 15 districts of Chhattisgarh.

Key Learnings:

- Photovoltaic (PV) systems typically have higher capital costs but lower operating costs when compared to other energy generation options
- National standards for the placement, design, procurement, installation, and servicing of PV systems can help improve sustainability
- The availability of replacement components (model and brand) from local vendors should be considered when procuring initial system components.
- End-user expectations of solar systems are often unrealistic – training on the practical application of solar systems must accompany system design and installation
- Donor-funded PV systems often fail for lack of operating funds and local service infrastructure
- The quality of services provided at a PHC is strongly linked to the availability of infrastructure
- Cold chain and neonatal care equipment play a critical role in improving health outcomes
- Availability of trained manpower is critical to providing the necessary healthcare services and maintaining the required quality of care
- Voltage fluctuation can affect the functioning of critical equipment and sometimes cause damage
- Capturing the multidimensionality of electricity access, that is, capacity, duration and availability, reliability, quality, affordability, legality, convenience, and health and safety help to accurately assess the impact of electricity access on healthcare service delivery

Case Study 3: Chipatala Cha Pa Foni (Health Centre by Phone) CCPF: An mHealth solution to healthcare in Malawi

CCPF is an mHealth solution launched by VillageReach, a U.S.-based organisation whose mission is to increase healthcare access for underserved communities in low-and-middle-income countries. CCPF provide healthcare information and advice targeting women of childbearing age, pregnant women, and caretakers of children less than five years old. CCPF's technology platform has three components:

- **Hotline:** A toll-free telephone hotline is open from 7:00am to 7:00pm and anyone can call to receive more information and advice on maternal and child health and reproductive health.
- **Message System:** CCPF also includes a mobile messaging system that sends regularly scheduled text or voice messages that provide tips and reminders about maternal and infant health.
- **Interactive Voice Response (IVR):** A voice solution that allows users to retrieve messages on-demand.

VillageReach partnered with the national Ministry of Health (MOH) and Airtel in January 2016, a leading mobile network operator (MNO). Airtel had a Dial-a-Doc programme which launched around the same time as CCPF in 2011. VillageReach and Airtel merged their services and re-branded the programme as Airtel CCPF. All calls to Dial-a-Doc were rerouted to the CCPF hotline. The hotline still operates out of the Balaka District Hospital and is staffed with two to seven hotline workers, depending on the volume of calls.

VillageReach received a grant from the IWG programme which enabled it to conduct research on the feasibility of multiple business models that would allow it to scale the programme. In order to grow, CCPF needed to expand into more districts in Malawi. Using the "district-by-district" strategy, CCPF expanded to 25% of districts in Malawi.

Key Learnings:

- Multichannel marketing is more effective; community outreach is more effective when players from different sectors are engaged. Through its partner Concern Worldwide Malawi, VillageReach promoted the service by leveraging volunteers to reach out to the community one person at a time,

- using radio ads and distributing posters and flyers
- Find influential champions: VillageReach was able to achieve the partnership with Airtel with support from GSMA, who helped to broker the relationship
- Continuously engage users in content development, seek user feedback and deliver the message in vocabulary that is understood by users
- Involve more local stakeholders: Church and traditional community leaders are trusted and can be partners in helping to publicise CCPF throughout the community
- Value-added partnerships are attractive investments for donors, social impact investors and governments as they spell out scalability

References and further reading

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