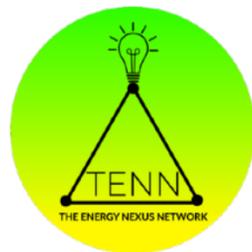


SELCO FOUNDATION | THE ENERGY NEXUS NETWORK (TENN)

Sierra Leone

Ecosystem Mapping for Health + Sustainable Energy Programs



MAY, 2020

SELCO Foundation

Since its inception in 2010, SELCO Foundation has worked to create a holistic ecosystem to provide reliable energy services to underserved communities. It envisions a socially sustainable society: and seeks to create avenues for asset building, enhancement in quality of life and wealth creation so as to uplift deprived sections of society through sustainable development solutions. Its mission is to:

1. Systematically identify diverse needs of underserved communities, understand and define the role of sustainability and energy in these communities.
2. Create and support innovative and sustainable solutions that positively impact wellbeing, education and livelihoods and work towards the alleviation of poverty.
3. Foster ecosystem development in the social sector through holistic thought processes in technology, finance, entrepreneurship and policy.

SELCO Foundation uses soft funding and flexible capital to develop robust and field-proven technological and financial models in the field of energy and sustainability. It aims to generate public awareness about these models, while also building the ecosystem for the creation and delivery of such solutions. The Foundation supports replication and utilization of these models in other deprived regions of India and the world, thereby achieving greater leverage on resources.

The Energy Nexus Network (TENN)

The Energy Nexus Network (TENN) is a regional energy ecosystem hub in Sierra Leone for innovating and scaling sustainable energy solutions. TENN is a driver for ensuring sustainable energy access, targeting economic development and improved wellbeing by:

- *Leading action on energy access for economic development*
- *Facilitating action on energy access to support energy enabling SDGs*
- *Building social ecosystems (enabling conditions and processes) for innovating and scaling sustainable energy solutions*
- *Facilitating dialogue and cross-sector engagement to strengthen inter-sector linkages and the nexus between key development themes*
- *Providing evidence-based policy advice and technical services through interdisciplinary research and analysis.*

TENN was founded with the following notions that: access to energy for all is a persistent challenge and a major development priority for Africa; energy is the decisive enabler for many development priorities, such as poverty alleviation, food security, improvements in health and education, access to clean water and sanitation and economic empowerment, especially for women; the energy system is strongly interdependent and intertwined with other human and natural systems (such as water, health, climate change, land and food production systems and industry); producing and providing energy services in the wrong way has serious negative impacts both locally and globally.

Table of Contents

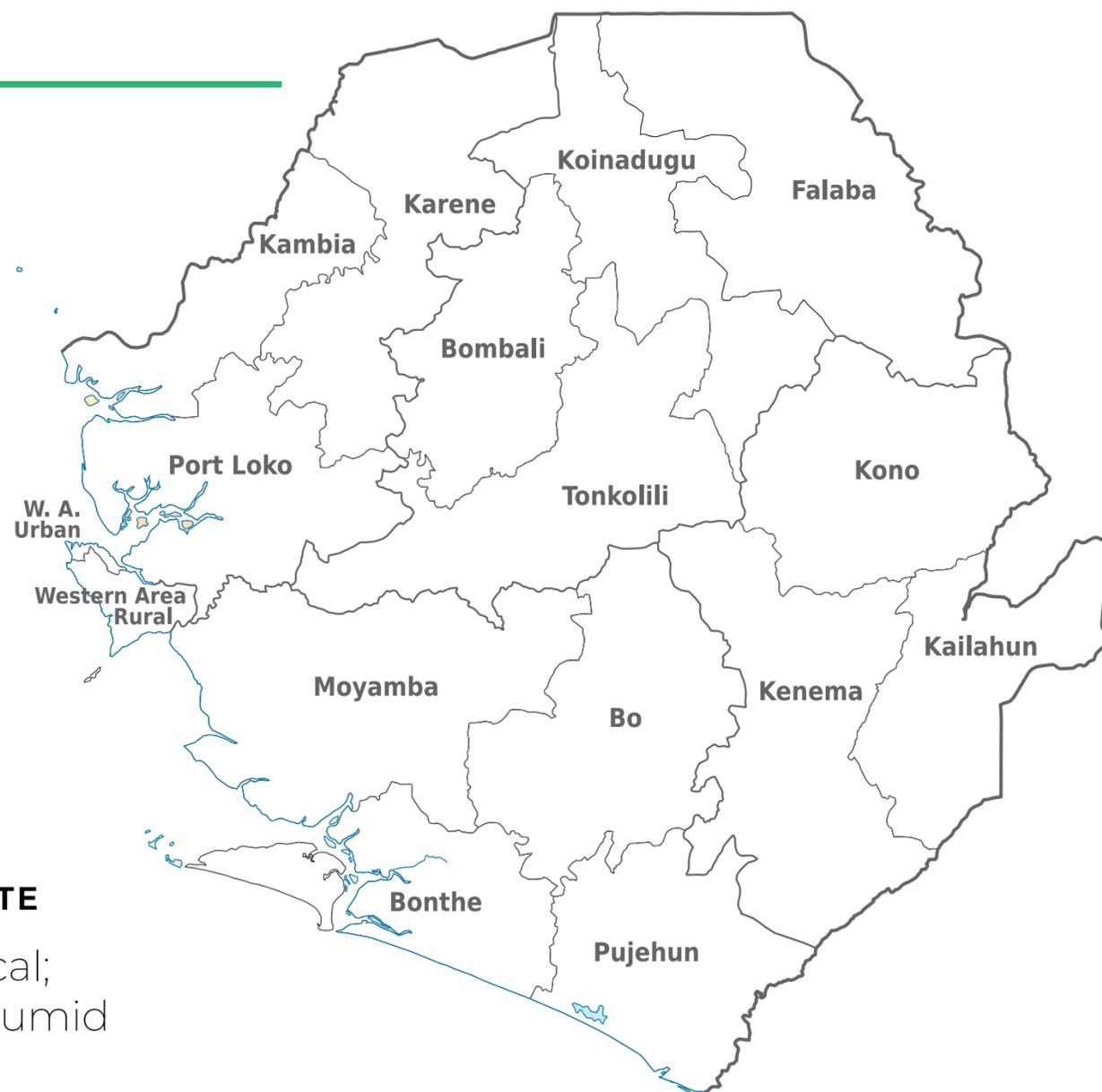


1. Purpose
2. Health Scenario
3. Healthcare Delivery Infrastructure
4. Health Policy Framework
5. Strategic Priority Mapping
6. District Focus – Kambia
7. COVID-19 Scenario
8. Potential Stakeholder Mapping
9. Way Forward

Sierra Leone

The name sierra leone means 'Lions Mountains' in Portuguese. It is a lush tropical country with beautiful beaches and some of the world's richest natural resources and minerals. Despite this, it is one poorest and least developed countries in the world. It is still recovering from a 10 year long civil war in which tens of thousand died.

In Map - A look at Sierra Leone's Districts & Borders



CAPITAL

Freetown

AREA

71, 740 sq. km

CLIMATE

Tropical;
hot, humid

LANGUAGES SPOKEN

English(Official), Mende (In the South), Temne (In the North) and Krio

POPULATION

7,650,150

POPULATION DISTRIBUTION

42.1% live in urban areas

57.9% live in rural areas

GDP (Current USD)

USD 4.085 Billion

PER CAPITA INCOME

USD 1,480

LIFE EXPECTANCY AT BIRTH

<http://hdr.undp.org/en/data>

Females

55.1 yrs

74.9 yrs
Global Average

Males

53.5 yrs

70.4 yrs
Global Average

1. Purpose

The document is a compilation of secondary research and relevant statistics on the health sector of Sierra Leone. This is developed in order to provide a background understanding of the sector as a foundation to develop health and energy nexus programs to strengthen the healthcare delivery environment in the country. The collaboration between The Energy Nexus Network (TENN) and SELCO seeks to develop partnerships between local stakeholders to develop sustainable energy interventions across different nodal points of the healthcare sector. As a potential pilot region, the district of Kambia has also been detailed as it's selection provides a template to build models for other districts in Sierra Leone and even for the Mano River Union (MRU) sub/region.

With the stress emerging from COVID-19 on the healthcare infrastructure, the criticality of building resilience in the healthcare sector has significantly increased. As a first step towards building effective implementation models, this document approaches the sector mapping exercise by outlining certain key aspects such as the current context, health delivery infrastructure and policies while addressing national health priorities wherein the energy and health nexus could play a catalytic role in accelerating progress towards national health goals. The document is aimed to provide a foundation to SELCO-TENN partnership to develop country-based health implementation programs through partner organisations.

2. Health Scenario

There have been significant efforts to strengthen Sierra Leone's healthcare sector. Since the Ebola outbreak in 2014-16, Sierra Leone has been acknowledged and appreciated for its response, its containment efforts and developing resilience of the healthcare system. Sierra Leone was the second worst hit country after Liberia by the most widespread Ebola virus disease epidemic in history between 2014-2016¹. In total, 8706 people were infected, of which 3590 died during this period.

However, at the same time there continues to be a slew of preventable disease burdens that are overwhelming the country's healthcare system. Communicable diseases are the leading cause of death and disease in Sierra Leone, of which malaria is the single biggest killer, accounting for 38% of all hospital admissions. Tuberculosis is another significant public health problem, with an estimated three new infections per 1000 people each year. While the country may often be associated with Ebola, a lesser known health indicator is that the country is estimated to have the world's highest maternal mortality ratio. Infant mortality is also very high. Almost one third of under-five children suffered from stunting in 2014. Anaemia is another serious public health problem among pregnant women (70%) and under-five children (76.3%)².

1. <https://www.bbc.com/news/world-africa-28755033>

2. WHO Country Cooperation Strategy for Sierra Leone

Mortality and Health Estimates

■ Sierra Leone

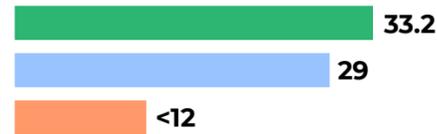
■ Global Average

■ SDG Targets

Births attended by skilled health personnel (%) (2013)



Neonatal mortality rate (per 1000 live births) (2016)



Under-five mortality rate (2016)



Maternal mortality ratio (per 100,000 live births) (2015)



Equivalent to 8 maternal deaths a day

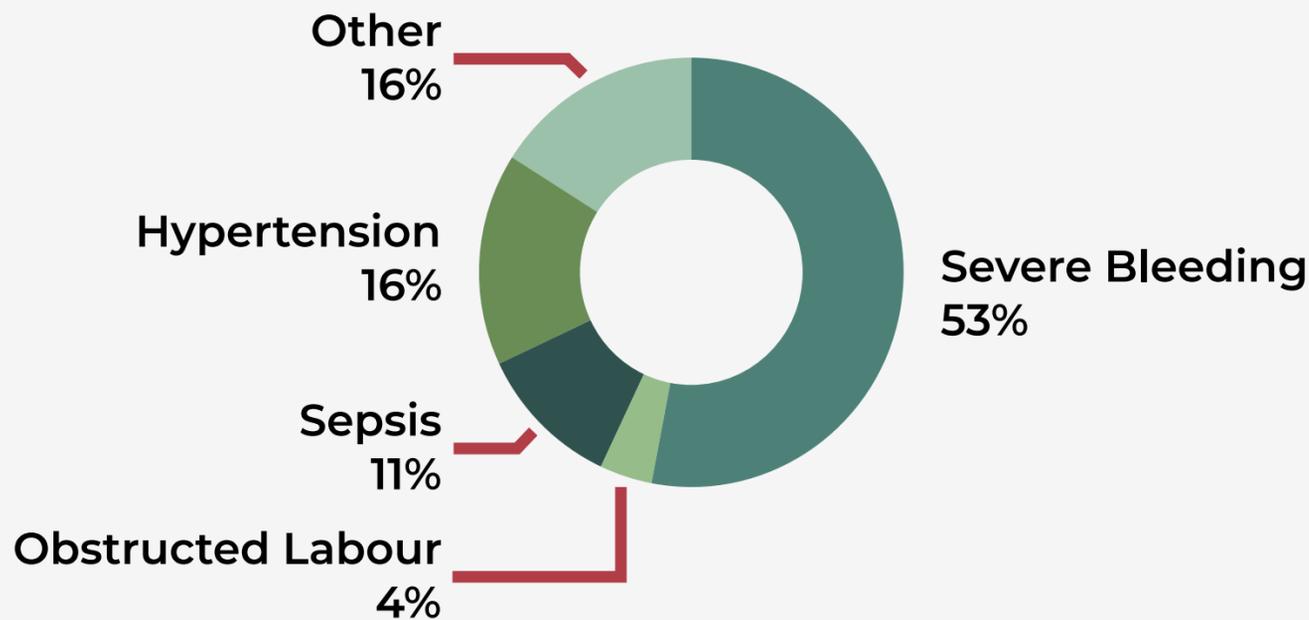
76%

Received 4 Ante Natal Care visits

46%

Did not deliver in a health facility

WHY ARE NEW MOTHERS DYING IN SIERRA LEONE?



Sierra Leone faces shortage of skilled healthcare providers (doctors, nurses and midwives), with the most critical staff shortages in the mid and higher level clinical tiers

Distribution of the Health Workforce



Distribution of the Total Population



WHAT DO THEY NEED?

Quality care during and after delivery

Quality antenatal care

Good health & nutrition

Family Planning

3 quarters of the entire health workforce in Sierra Leone is concentrated in only 10% of the health facilities

https://www.who.int/gho/child_health/mortality/neonatal_infant_text/en/
 WHO Country Cooperation Strategy for Sierra Leone
https://www.who.int/gho/child_health/mortality/mortality_under_five_text/en/
[https://www.who.int/data/gho/data/indicators/indicator-details/GHO/maternal-mortality-ratio-\(per-100-000-live-births\)](https://www.who.int/data/gho/data/indicators/indicator-details/GHO/maternal-mortality-ratio-(per-100-000-live-births))
[https://www.who.int/data/gho/data/indicators/indicator-details/GHO/births-attended-by-skilled-health-personnel-\(-\)](https://www.who.int/data/gho/data/indicators/indicator-details/GHO/births-attended-by-skilled-health-personnel-(-))
<https://www.afro.who.int>

3. Health Care Delivery Infrastructure

Health Facilities⁸

Sierra Leone has roughly 1,190 public health facilities, although the number of facilities and their designated levels of care frequently change as new facilities open and existing facilities close. At the facility level, there is varying engagement from local entities with a variety of different names — such as Facility Management Committees (FMCs) and Village Development Committees (VDCs). Regardless of nomenclature, these kinds of groups are designed to facilitate engagement from the local community and chiefdom officials in the management of the facility and the monitoring of its staff, supplies, services and patient outcomes.

| HOSPITALS | PERIPHERAL HEALTH UNITS (PHUs) | | |
|---|---|---|--|
| <p>Sierra Leone has 24 hospitals — of which 9 are located in the Western Area, including the three primary tertiary hospitals: Connaught, which is the largest hospital in the country and provides specialty care across a range of areas; Princess Christian Maternity Hospital, which provides maternity services; and Ola During Children’s Hospital, which provides care for Sierra Leone’s children.</p> <p>Several other specialty care hospitals exist in the Western Area, such as the Kissy Mental Hospital. The remainder of Sierra Leone’s hospitals provides secondary referral care, with at least one hospital per district functioning as a Comprehensive Emergency Obstetric and Newborn Care (CEmONC) centre.</p> | <p>There are roughly ~1,190 PHUs, although this number increases or decreases by a factor of roughly 50 facilities depending on regular openings and closings, as well as a lack of maintenance. There are three types of PHUs:</p> | | |
| | COMMUNITY HEALTH CENTRES (CHCS) | COMMUNITY HEALTH POSTS (CHPS) | MATERNAL AND CHILD HEALTH POSTS (MCHPS) |
| | <p>There are 227 CHCs, which are generally larger facilities that are meant to cover populations of roughly 10,000-20,000 individuals. They typically employ higher-skilled staff, such as Community Health Officers (CHOs), midwives and so on, with some focus on epidemiology and environmental health. Some of these facilities also function as Basic Emergency Obstetric and Newborn Care (BEmONC) centres.</p> | <p>There are 320 Community Health Posts, which are medium-sized facilities designed to serve a population of roughly 5,000-10,000 individuals. They are generally staffed by lower-skilled health workers, such as State Enrolled Community Health Nurses (SECHNs) and Maternal and Child Health Aides (MCH Aides).</p> | <p>There are 616 MCHPs, the most numerous of the various levels of care, which is meant to provide the first point of contact with the facility- based health system. These facilities are meant to be located at the village level and serve populations of less than 5,000 individuals. They are largely staffed by MCH Aides.</p> |
| <p>COMMUNITY HEALTH WORKERS (CHWS)</p> <p>Below the health facilities, a number of Community Health Workers are also operating at the village level, providing another layer of care.</p> | | | |

⁸ https://extranet.who.int/countryplanningcycles/sites/default/files/planning_cycle_repository/sierra_leone/sierra_leone_nhssp_2017-21_final_sept2017.pdf

HEALTH CARE LEVEL/
HEALTH CENTRE TYPE

CATCHMENT AREA
(POPULATION)

DESIGNATED
HUMAN RESOURCES

RANGE OF
SERVICES

TERTIARY CARE

Regional Hospital

Regional population covering East, North and South

Specialist Doctors, Midwives, Nurses, Nutritionist, clinical and support staff

In addition to service provided by District hospitals, they also handle complex infectious diseases, emergency services, surgery and radiology.

SECONDARY CARE

District Hospital

Catchment population of 5,00,000

Doctors, Midwives, Nurses, Nutritionist, clinical and support staff

Secondary Medical care, emergency medical care, comprehensive obstetric and neonatal care, General surgery, Operation theatre, Extensive lab with X-Ray and Ultrasound.

PRIMARY CARE

Community Health Centre

Catchment population of 10,000 to 30,000 or more within 15 km (10 miles) radius of the facility.

Community Health Officer (CHO), supported by a team consisting of a CHA, CHNs, Midwives, MCH Aides, and other clinical and support staff.

Advanced Preventive and curative services; Emergency & Obstetric care; laboratory; Pharmacy

Community Health Post

Serves a population of 5,000 to 10,000 or more within 8 km (5 miles) radius of the facility.

Community Health Assistants (CHA)/ Community Health Nurse (CHNs)/Midwives

Similar functions to the MCHP with added curative functions. Complicated births and obstetric and neonatal emergencies

Maternal and Child Health Post

A population of 500 to 5,000 within a 5 km (3 miles) radius of the facility

MCH aides

Antenatal care, safe and skilled deliveries (without complications), postnatal care and child health services.

There are 1,190 health centres and less than 200 doctors in Sierra Leone. The most recent Sustainable Development Goal Index sets 44.5 doctors, nurses, and midwives per 10,000. Taking only the higher cadre nurses, Sierra Leone has only 1.4 doctors, nurses and midwives per 10,000 people. Ninety per cent of the doctors are based in the western parts, many being in administrative roles. The country has only one known gynaecologist in the public sector.⁹

One of the other critical challenges in the management of these facilities is the lack of a formal process by which a facility is formally accepted or accredited by the central Ministry of Health & Sanitation (MoHS) prior to opening. In addition to these public sector facilities, there is a small but important sector of private, not-for-profit and faith-based facilities that also provide care in Sierra Leone.

4. Health Policy Framework

Overview

The Sierra Leonean health system faces challenges due to chronic underfunding, a heavy disease burden and vastly insufficient numbers and skewed distribution of skilled Human Resources for Health (HRH). An important barrier to accessing health services is the cost of services and the inability of the population to financially access service. **In 2017, the out-of-pocket (OOP) health expenditure increased to 50.4% from 41.6% in 2016. The global average being 18.55%.** Further, drug availability in health facilities is a challenge, with shortages and stock-outs.

In a bid to work towards the attainment of SDG3 through Universal Health Coverage (UHC) the Ministry of Health and Sanitation started the implementation of the newly developed National Health Sector Strategic Plan 2017-2021.

To address financial inaccessibility the Free Healthcare Initiative was introduced in 2010 to abolish user fees for all pregnant and lactating women and under-five children. Government launched the Sierra Leone Social Health Insurance (SLeSHI) in 2018 to improve financial accessibility to health care. To address financing for health holistically, the Government has initiated the process to develop a comprehensive health financing strategy.

Health+Energy Nexus Within Policy Framework

As per Service Readiness and Availability Report (SARA) released by MoHS in 2017, only 23% of health care centres have access to a power source. Moreover, there were deficiencies in immunisation service which requires that the focus needs to be on improvement of cold chain equipment and maintenance of the cold chain. **One in every three health facilities assessed did not have a refrigerator, and only one third of facilities could maintain adequate refrigerator temperatures.**

These critical energy gaps can stymie health care delivery, even when the medical equipment/appliance are available within the centre. **Further, even in the presence of a functioning health centre, the cost of accessing health facilities due to lacking transportation networks provides a barrier to true Universal Health Coverage.** Hence, there is an urgent need to improve energy access and innovate for decentralising health services further and identify policy options that provide scope of sustainable energy inclusion.

At the same time, collaborations and partnerships between the policy stakeholders and other development stakeholders is of pivotal importance, as underscored by SDG 17. Unless, there are common spaces and avenues for dialogue, communications between the two, the goals will remain incomplete or delivered inefficiently. Hence, proactive steps towards identifying these spaces, especially from the perspective of a health-energy nexus can be explored within the existing policy frameworks.

Table Showing Major Policy Programs With Scope for Energy Inclusion

| Policy Program | Specific Scope | Policy options for Sustainable Energy Inclusion |
|--|---|---|
| <p>National Malaria Control Strategic plan</p> | <p>This strategic plan proposes to use three vector control strategies; long lasting insecticide treated Nets (LLINs), indoor residual spraying (IRS) and larval source management (LSM) will be deployed according to the risk stratification context.</p> | <ul style="list-style-type: none"> - Indoor residual spraying (IRS) for control of malaria vectors is a key deterrent in spread of Malaria. Energy can play a critical role in strengthening the vector control strategy using the IRS method. - For malarial diagnostic, laboratory for disease surveillance could be strengthened by backing up with sustainable energy. - Lab and testing facilities can be decentralised through mobile vans, with services powered through solar energy. |
| <p>Reproductive, maternal, new-born and child policy (RMNCAH)</p> | <p>The RMNCAH policy framework is organized into five domains: reproductive and maternal; new-born; child; adolescent; and health systems strengthening (HSS) for RMNCAH.</p> | <ul style="list-style-type: none"> - Localized and reliable access to power for healthcare can ensure strengthening of community health systems for increased demand and uptake of RMNCAH services at both community and facility levels. - Decentralized solutions for health workers such as maternal kits could increase the outreach of healthcare delivery. This applies to all five policy domains as mentioned. |
| <p>National Tuberculosis strategic Plan</p> | <p>One of the pillars for NTS plan has been integrated patient centred care and prevention. This approach requires early diagnosis of TB including universal drug-susceptibility testing, and systematic screening of contacts and high-risk groups.</p> | <p>Tuberculosis strategic plan outlines strategies for laboratories strengthening and surveillance.</p> <ul style="list-style-type: none"> - Inclusion of reliable energy for drug-susceptibility testing and systematic screening for laboratories could play a critical role. |
| <p>National HIV/AIDS strategic Plan</p> | <p>To increase HIV testing volume, Sierra Leone adopted the HIV testing approaches in 2016 and has been scaled up Countrywide throughout 2017.</p> | <p>One of the key strategies has been to increase testing apparatus in extended rural situations. The testing also requires that blood specimens are safely transported without spoilage.</p> <ul style="list-style-type: none"> - Given the blood hemolyzes in room temperature, solar powered refrigeration solution can maintain the specimens in the safe range of 2-6 degree celsius. - Solar powered HIV labs can strengthen the testing & diagnostic network across the rural settings by backing with reliable energy. - Decentralised HIV care centres can also be set up |

5. Strategic National Health Priority Mapping

Based on analysis of WHO country cooperation strategic agenda and Health Strategic Sector Plan II for the 2017-2021, transplanting health+energy innovations, energy efficient technologies and new processes can accelerate the achievement of health goals as envisioned.

| Strategic Priorities | Main Focus Area | Health + Energy Nexus |
|--|--|--|
| <p>Improve reproductive, maternal, new-born, child and adolescent health.</p> | <ul style="list-style-type: none"> Strengthen national and decentralized capacity to improve access to and utilization of quality reproductive, maternal, new-born, child and adolescent health (RMNCAH) interventions Support policy dialogue to advance adolescent health programming and improve access to sexual and reproductive health especially for adolescents Strengthen national nutrition surveillance systems and management of nutrition disorders among mothers, infants and young children, towards the global nutrition targets Strengthen immunization systems to provide and sustain universal immunization coverage; undertake acute flaccid paralysis and other vaccine-preventable diseases surveillance; and introduce new vaccines | <p>In Sierra Leone where 99% of population in rural areas do not have access to power, critical health facilities function in a precarious context. Powering the health centres using off-grid decentralized solutions is a sustainable solution. Energy-efficient technologies that strengthen the various nodal points across the maternal & newborn value chain will be an effective strategy in improving MMR status in rural areas. Portable solutions such as Maternal and child health kits deliver an extension arm to drastically improve the accessibility and affordability of such services.</p> <p>Solar powered efficient vaccination technologies and medical cold chains can strengthen the immunization system and move the needle towards universal immunization systems. Use of appropriately sized DC powered Surechill refrigeration has been tested and evaluated for maintaining the quality of vaccines.</p> |
| <p>Strengthen capacities for public health security and emergencies</p> | <ul style="list-style-type: none"> Support achievement of IHR (International Health Regulations, 2005) core capacities, including the nationwide establishment of the Integrated Disease Surveillance and Response system for infectious diseases and other disease threats. Support the development and implementation of preparedness and response measures for public health risks associated with disasters. Strengthen national capacities to develop and implement plans and policies to reduce environmental risks to health, including waste management and vector control | <p>Deploying COVID technologies in the recovery pathway will find appropriate usage within COVID preparedness strategies of Sierra Leone. The energy and spatial interventions strengthens the pathways to COVID recovery from point of isolation, quarantine, testing to varied degrees of therapeutic care.</p> |
| <p>Reduce morbidity and mortality from major communicable and non-communicable diseases</p> | <ul style="list-style-type: none"> Support the prevention, management and control of HIV and AIDS, malaria, tuberculosis, neglected tropical diseases and other communicable diseases Support the prevention and management of non-communicable diseases and mental health problems | <p>Having access to reliable laboratory facilities for testing communicable diseases is a critical tool in prevention & management of diseases. Solar-powering care centres for HIV/AIDS, Malaria, tuberculosis and placing energy efficient equipment in laboratories and clinics enable decentralization of services to rural areas.</p> |
| <p>Support health systems strengthening</p> | <ul style="list-style-type: none"> Strengthen health system capacity and management at the national, district and community levels to deliver and increase access to effective and high quality health service Strengthen capacity to develop strategies and interventions to improve the supply and management of human resources for health. Improve the health information system and ensure integration among the different health information systems Provide support for increasing the accessibility, quality and safety of medicines Support sustainable health financing | <p>Affordability and Accessibility have emerged as critical barriers in improving health status in Sierra Leone. Hence, adding a mobility dimension to static healthcare can have a multiplier effect. Solar-powered mobile health vans and boats can deliver critical health care delivery to coastal regions as well as interiors of Sierra Leone. Using Telemedicine as a technology is an efficient strategy to leverage skilled health resources especially in the manpower shortage situation of Sierra Leone. Telemedicine centres can be backed up using sustainable energy. Local governing mechanisms & practices that leverage ownership and financing at the health centre level can be employed for operational expenses of solar assets.</p> |

6. District Focus - Kambia District

Why Kambia

Sharing the border with Guinea in the north, Kambia holds a critical place in the country's geographical and political scenario. As one of the districts with high vulnerability of being affected by COVID through possible movement of people from Guinea, Kambia has taken several strict measures of lockdown from the early days of the crisis. Even the Government had recognised the potential risk of medical facilities getting overwhelmed if the COVID cases go up in the district, hence the district went under lockdown very early.

With just an average of 1.92 PHUs and 0.03 hospitals for 10,000 people, and just 0.8 doctors whereas more than 6 frontline healthcare workers for 10,000 people, the healthcare delivery would have to be strengthened and decentralised by building capacities of last-mile healthcare facilities and frontline healthcare workers to bring more effectiveness. With an opportunity to cap the entire district's population, strengthening different nodal points in the healthcare value chain provides a potential template that could be replicated in other districts of the country, and also in other countries of West Africa, especially the countries belonging to the sub-regional bloc MRU, namely, Guinea, Cote d'Ivoire, Liberia and Sierra Leone.

Context

Kambia District is in the North Province and borders with the Republic of Guinea to the North. The district population is ethnically diverse. It is a vital trade route between Sierra Leone and Guinea.

Livelihood & Economy

The livelihood activities of the district residents are mainly farming (rice and roots crops - cassava and yam), followed by cross-border trade with neighbouring Guinea. A revival of the cross-border trade in the traditional markets known as "Loumah" increased, from 5 in the pre-war period to 15 currently, in the towns and villages on both sides of the border. These markets attract thousands of traders and other visitors from far-off areas, including from Freetown and Conakry. People also engage in fishing and very small scale animal rearing. Men engage in fishing activities, while fish trading in the market is carried out by women.

Population Distribution

The projected population data 2014¹ breakdown by age group indicates that 46% of the district population contributes to the workforce and 49% of the population is below the age of 15 years old. 34% of children between the ages of 5-11 years are engaged in some form of labor/economic activities.

Health

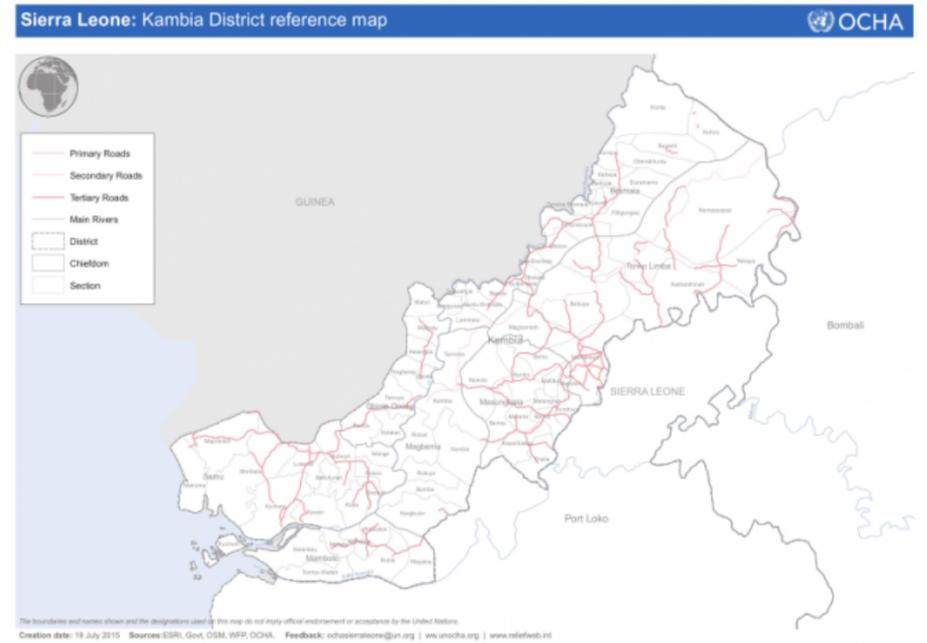
The main hospital is in the district capital of Kambia Town; each of the 7 chiefdoms has a Health Centre or Health Post. In Kambia District, the inability to pay for treatment, distance to health facilities and unwillingness to visit health facilities alone are three critical barriers to healthcare access. Acute respiratory infection (ARI), fever and diarrhoea are the most common diseases among children under 5 in the district. Since the outbreak of Ebola in mid-2014, the entire health system and services provision has primarily focused on Ebola, specifically surveillance, control, and treating the infected.

Kambia

Sierra Leone



In Map - Kambia District with main towns and cities



AREA

3,108 sq. km

POPULATION

345,474

KAMBIA VS SIERRA LEONE HEALTH STATISTICS

● ■ Kambia Average

● ■ Sierra Leone Average

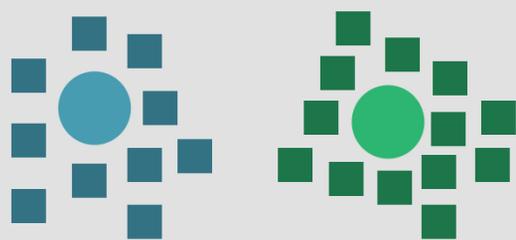
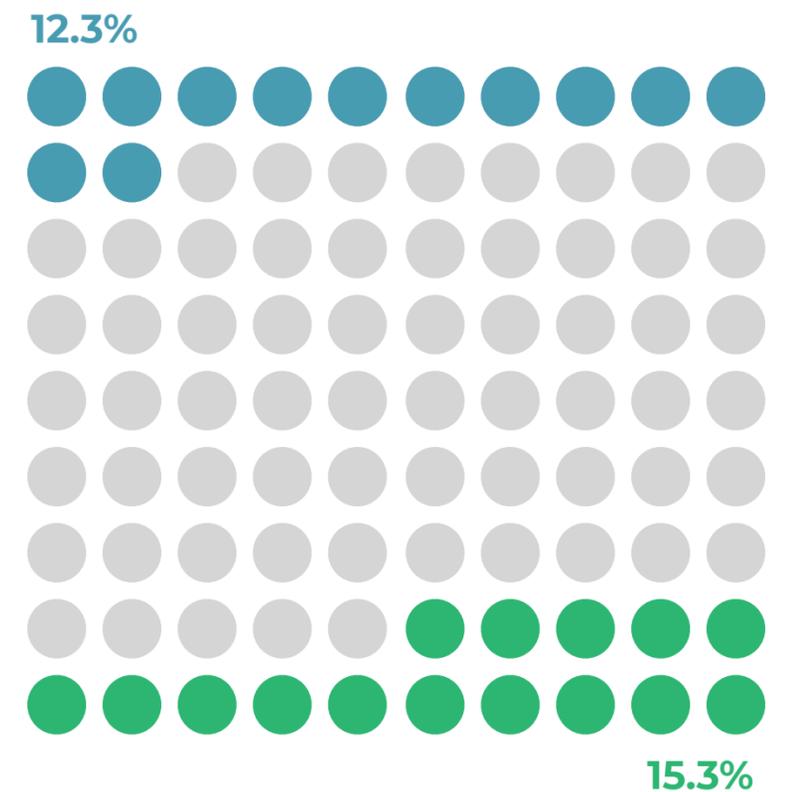
NUMBER OF REPORTED MATERNAL DEATHS PER 100,000 LIVE BIRTHS



UNDER 5 MORTALITY RATE (PER 1000 LIVE BIRTHS)



POPULATION LIVING MORE THAN FIVE MILES FROM A HEALTH FACILITY



POPULATION/PER PHUs

□ 500 People

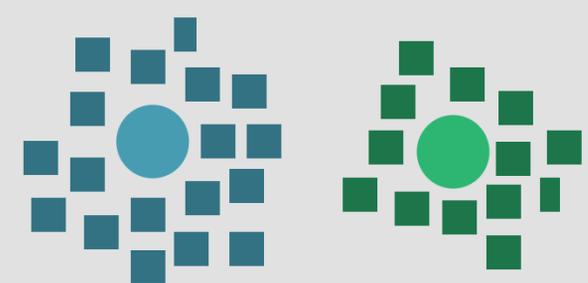
○ 1 Health Facility



POPULATION/PER DOCTOR

□ 10,000 People

○ 1 Doctor



POPULATION/PER HOSPITAL

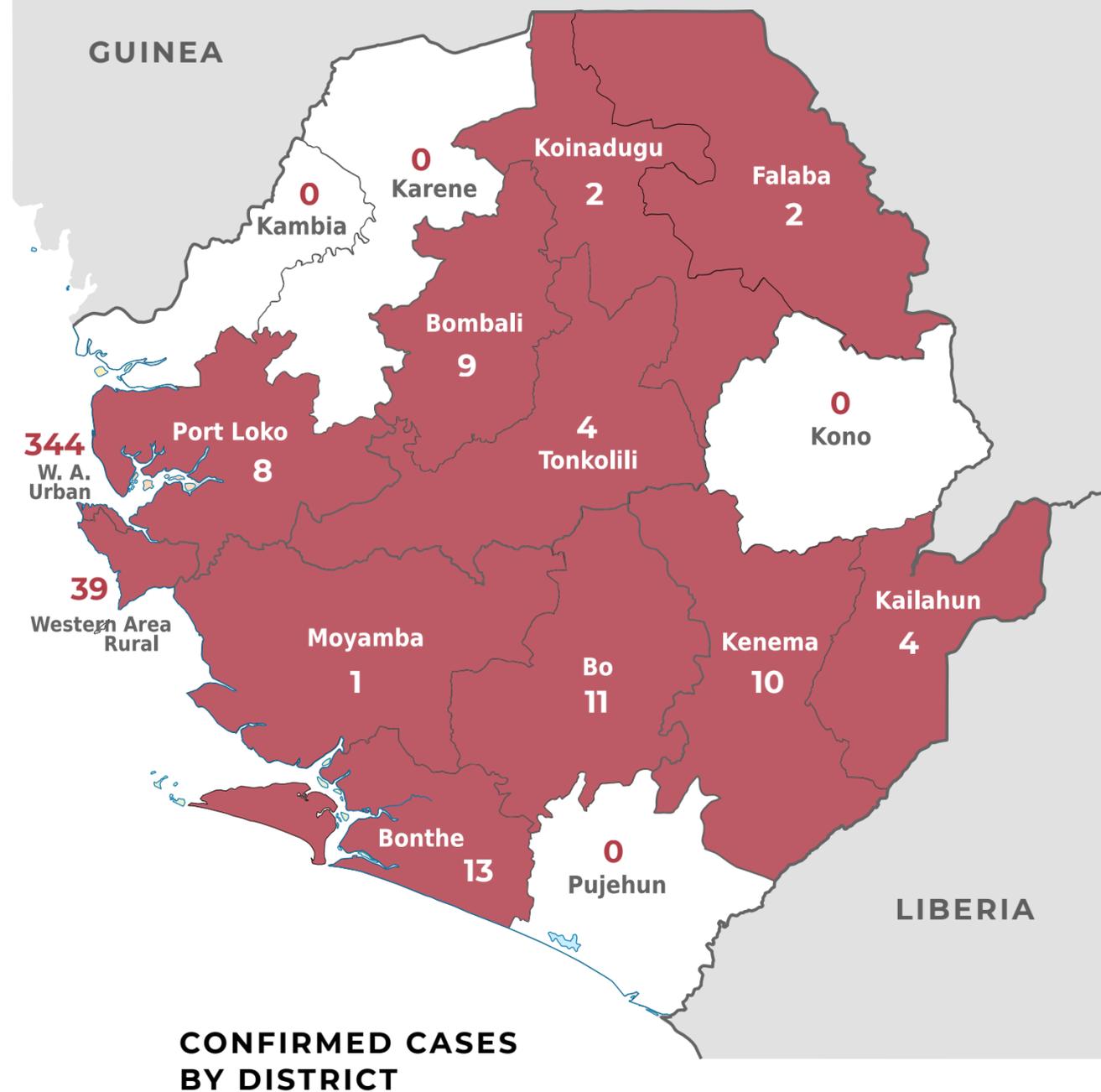
□ 20,00 People

○ 1 Health Facility

7. COVID-19 Scenario

As with other African countries, COVID 19 was slow to arrive in Sierra Leone. The weak health infrastructure and existing disease burden can cause health situations to spiral out of hand.

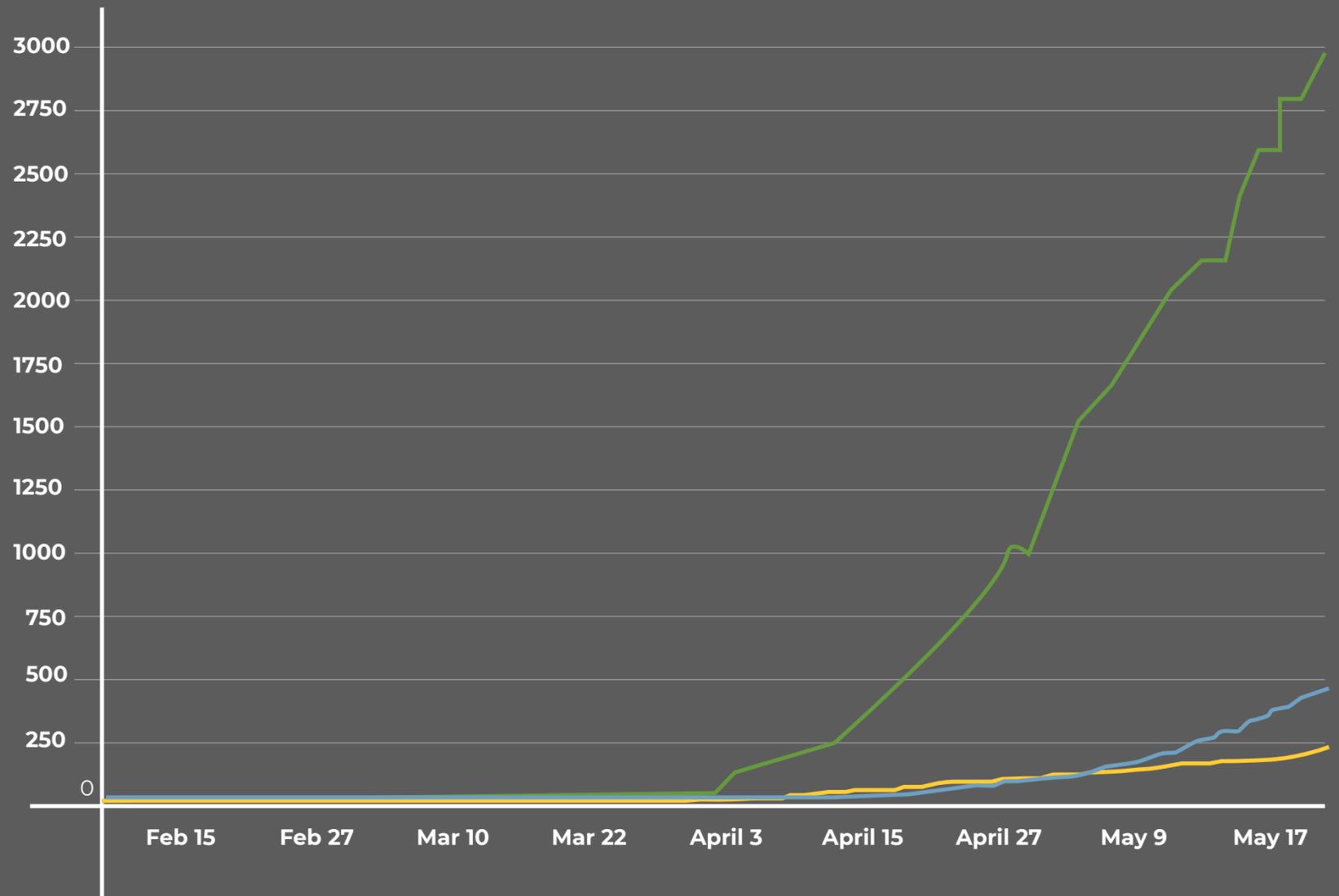
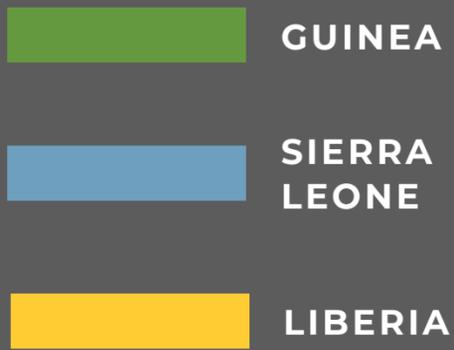
Sierra Leone administration has drawn upon learnings from the Ebola response in 2014-16 for better preparedness against COVID. Sierra Leone developed a COVID-19 preparedness plan three weeks before its first case was confirmed. This enabled the Ministry of Health to quickly identify, test and quarantine most of the primary contacts of the index case, thereby limiting spread of the disease. Sierra Leone has substantially improved public health systems since the Ebola outbreak. Moreover, the Ebola response infrastructure required is very similar to that required for stemming COVID spread.



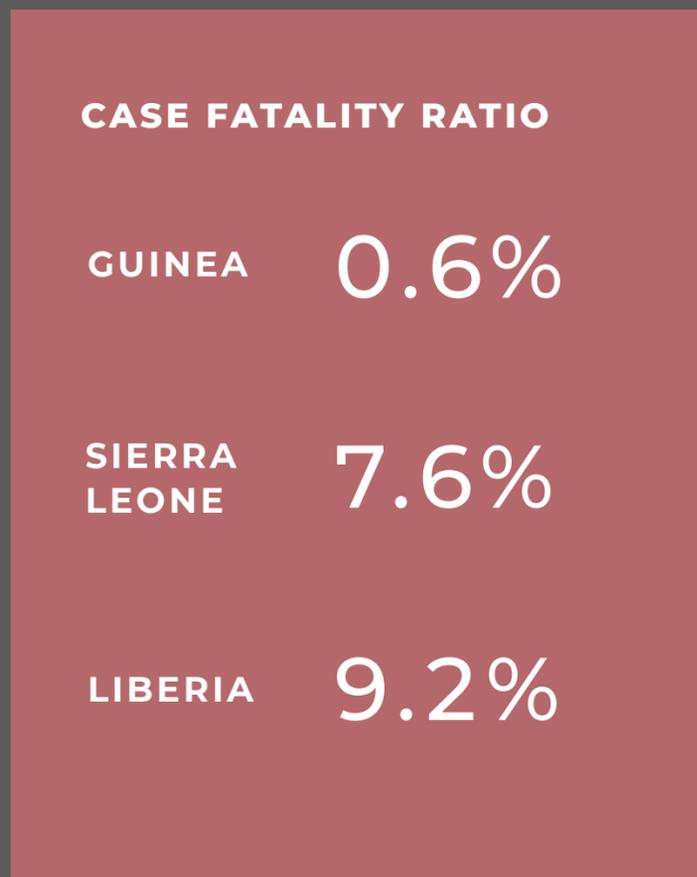
The revitalisation of the country's disease surveillance system, the establishment of emergency operation centres (at both at national and district levels), and the development of strong networks to support community outreach and mobilisation also played crucial roles in putting the country in better position to withstand the contagion

Kambia has been a critical region in Sierra Leone due to several cross-border entry points with Guinea and illegal migrations. Hence, establishing COVID testing centres is a strategic and critical need for the district and the country as a whole. Since the district already have mini-grids connected to the healthcare centres, COVID testing and treatment facilities could be complemented with the existing mini-grid facilities or by modifying the loads in the existing facilities.

TOTAL NUMBER OF COVID 19 CASES



TOTAL NUMBER OF COVID 19 DEATHS



0 5 10 15 20 25 30 35 40

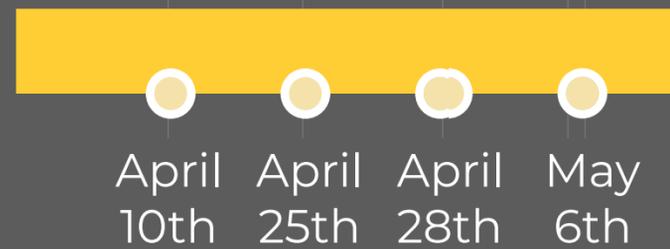
GUINEA



SIERRA LEONE



LIBERIA



8. Potential Stakeholder Mapping

| Sector | Partner Name/ Category |
|---|--|
| Governance | <ul style="list-style-type: none"> • National Government - Ministry of Health • Local Government Councils & Wards - Kambia District • Constituencies Representative Elected - Member of Parliament • Chiefdom Councils • Tribal Heads and Chiefs |
| Health | <ul style="list-style-type: none"> • District Health Management Team (DHMT) - Kambia District • Government Hospital - Kambia District • Pilot Maternal and Child Health Posts (MCHPs) - Kambia District • Pilot Community Health Centers (CHCs) - Kambia District • Pilot Community Health Posts (CHPs) - Kambia District • NGOs working in the health sector in pilot locations • CBOs working in the health sector in pilot locations |
| Innovation & Incubation | Fomel Industry and National Industrialization Centre (FINIC) |
| Finance | LBD Group |
| Training and Servicing | <ul style="list-style-type: none"> • FLS Group • Azimuth 360 • Fomel Industry and National Industrialization Centre (FINIC) • Institute of Leadership and Environmental Management (ILEM) |
| Energy & Technology & Implementation & Community connect | <ul style="list-style-type: none"> • Solar Era Holdings • Energen • Helios Solutions • Smiling through Light • Azimuth 360 |
| Key Stakeholders in Kambia | <ul style="list-style-type: none"> • Kambia District Development and Rehabilitation Organisation (KADDRO) • The Kambia Appeal |

8. Key Insights and Way Forward

Insight

Sierra Leone currently lacks sufficient health infrastructure to deliver solutions which has resulted in the country's low health indicators. With the context of COVID-19, the vulnerable healthcare sector would face significant stress. Gap in accessibility and availability of various aspects of healthcare facilities - from remoteness of communities to ineffective secondary and tertiary health facilities - necessitate a wide range of solutions built around decentralised sustainable energy interventions. Thus, mapping interventions across typologies of healthcare delivery points - from strengthening existing healthcare facilities to strategically deploying mobile health units and various healthcare kits to bring healthcare to doorstep; empowering existing healthcare workers; building institutional partnerships with various stakeholders are needed to build a strong healthcare delivery ecosystem in the country. The partnership between TENN and SELCO Foundation seeks to approach sustainable energy and healthcare implementation in Sierra Leone keeping long-term sustainability of the interventions at the centre.

Way Forward

The critical steps going forward from partnership, program development and implementation perspectives are:

Deep Dive in Kambia

As a next step, local partners will be identified towards building programs across the healthcare delivery value chain. The focus will be on the district of Kambia as a pilot program for the country. Towards that end, a multi stakeholder webinar was conducted to gather inputs from different partners who could play a potential role in development of programs in Kambia. The potential partnerships are discussed in the Annex section.

- A deep-dive assessment of Kambia District will be done to understand the specific nodal points in healthcare delivery where decentralised energy implementations could strengthen those areas. This is done as a pilot program to prove as a template - in capping the entire district to bring resilience and accessibility of healthcare to the entire population.
- Existing mini-grid facilities at the healthcare facilities in Kambia District would be mapped to identify potential possibilities of implementing COVID testing facilities with the existing infrastructure. The design of the program could plug into District Emergency Operations Center (DEOC) to support the strategies of the government.
- Proposals will be developed with local stakeholders - public and private institutions - supported by relevant funding resources to implement programs in the district of Kambia.
- Through the effective partnerships and implementations in Kambia, the program seeks to not only provide models for other regions of Sierra Leone, but also for other countries in West Africa.

ANNEX 1

Joint TENN/SELCO-Foundation consultative meeting with local partners in Sierra Leone: Outcomes and Next Steps

Purpose of the meeting

As a next step, local partners will be identified towards building programs across the healthcare delivery value chain. The focus will be on the district of Kambia as a pilot program for the country. As a first step, a multi stakeholder webinar was conducted to gather inputs from different partners who could play a potential role in development of programs in Kambia.

Proposed outcomes of the meeting:

1. Map out the partnership required in Sierra Leone to undertake the intervention
2. Identify potential specific intervention areas for partners needed for the intervention
3. Clarity on overall ecosystem support needed and approach required for the intervention

Key outputs of the meeting:

1. Each partner discussed potential areas where their role will be critical in developing health-energy implementation programs in Kambia District.
2. Following potential areas were suggested by the stakeholders where they would involve in the energy-healthcare ecosystem building in Kambia district
 - a. Mr. Rene Bangura, Helios Solutions: Education for local communities + They have experience of solar powering Ambulances with NEM
 - b. Ms. Mariama Kamara, Smiling through light: Community connect through engaging women groups + Homesystems for communities + Training communities + Payment recollection(?) + Radio communication
 - c. Ms. Leah Suma, FLS Group: Sanitation - Solar Water Pumps for preventing/ treatment/isolation/ post-treatment + Healthcare Facilities - WASH facilities;
 - d. Ms. Mireia Gil, A360: Oxygen Concentrator design and deployment + Designing solar energy systems for healthcare centers + Training for local technicians + sanitation
 - e. Mr. Sam Zoker, Energen: Business processes and operational models + bringing together partners (government + manufacturing + other partners) in delivering solutions to healthcare facilities.
3. Immediate next steps would be to identify the funding sources, develop relevant healthcare -energy intervention design typologies (healthcare center powering, COVID testing centers, mobile healthcare vans, training and awareness programs, water pumps for WASH, etc) while also considering the existing micro/ mini-grids, and identify and build partnership with local partners to implement solutions.

Quotes

"Considering the challenges rural Kambia offers and also not being very far from the capital, it provides a good place to begin implementations. We want to pilot the program in rural Kambia - if it is a success, we want to replicate it in other parts of Sierra Leone." **Dr. Paul Yillia**

"Whatever the output that comes out of this meeting, we should plug that into District Emergency Operations Centers interventions in the district." **Ms. Leah Suma**

"We are the closest point to Conakry - and we have many different routes in and out of the country to Guinea. As the cases are high in Guinea which makes Kambia very vulnerable, it is very critical to support healthcare centers in Kambia immediately." **Dr. Kandeh Yumkella**

"If the healthcare facilities are already powered by mini-grid, we need to transform a few of those to COVID testing facilities - from the energy access, efficient of equipment etc." **Dr. Kandeh Yumkella**

"Given the vulnerable situation of the healthcare facilities in Kambia and not having testing facilities could overwhelm the system when the cases come up here. So, it is critical to design solutions that would develop robust rural testing and treatment facilities." **Dr. Kandeh Yumkella**

"Can we look at expanding minigrids to accommodate the loads with independent systems, and plug and play models for the healthcare centers." **Mr. Rene Bangura, Helios**

"Can we consider pre-training programs of potential health workers - what could be the protocols when COVID cases do appear - to be prepared when the hardware is implemented." **Dr. Harish Hande**

"Over 4 million premature deaths is caused by pulmonary problems due to household air pollution, which makes the people even more vulnerable for COVID 19 - so how do we make a case in the post COVID-19 economy, there has to be significant investment in reducing household air pollution." **Dr. Kandeh Yumkella**

Attended participants

Partners in Sierra Leone

1. **Mr. Foday Suma, Co-Founder & Managing Partner**
FLS Academy College of Engineering (Technical Training)
3. **Ms. Sophie Johnson (large scale solar), Director**
Solar Era Holdings SL Ltd, Africa Growth and Energy Solution UK plc
5. **Mr. Sam Zoker, Chief Executive Officer**
Energen (Solar / mini grid)
7. **Mr. Abu Rene Bangura, Founder & CEO**
Helios Solutions SL Limited (Small-scale solar)
8. **Ms. Leah Suma, Executive Director FLS Group SL**
FLS Academy College of Engineering (Technical Training)
9. **Ms. Mariama Kamara, Director**
Smiling Through Light - Sierra Leone (Small-scale solar)

10. **Ms. Mireia Gil Sanchez, Co-Founder**
Azimut 360 SCCL
11. **Mr. Abraham Grass-Sessay, Managing Director,**
Institute of Leadership and Environmental Management (ILEM)

The Energy Nexus Network (TENN)

1. **Hon. Dr. Kandeh Yumkella, Chair & Founder**
2. **Dr. Paul T. Yillia, Lead - Strategy & Operations**

SELCO Foundation

1. **Dr. Harish Hande, Chief Executive Officer**
2. **Ms. Huda Jaffer, Director**
3. **Ms. Sarah Alexander, Senior Advisor**
4. **Mr. Shripathi Hadigal, Program Manager**
5. **Mr. Deepak John, Program Manager**



SELCO Foundation

www.selcofoundation.org | infor@selcofoundation.org

www.covid-19.selcofoundation.org | covid19@selcofoundation.org