Implementation research to explore impact of the DFID-supported and UNF-managed grant for the sustainable electrification of health facilities focusing on maternal and newborn health services in Ghana & Uganda.
The overarching goal of the study was to deepen the evidence base on linkages between accessibility and reliability of electricity in health facilities and service delivery outcomes, and to study barriers and facilitators in implementation of similar sustainable energy solutions, in particular at the primary care level.

Specific objectives were to:

• Monitor the pathways, barriers and facilitators in implementation of the UNF/DFID intervention “electrification of health facilities with solar systems”;

• Explore the impact of electrification of health facilities with solar systems on service delivery for maternal and new-born health, using routinely collected data;

• Describe how and why electrification of health facilities with solar systems affects demand for, utilization of and satisfaction with maternal and newborn services by mothers within the health facility catchment area;

• Develop policy-relevant evidence to integrate energy service considerations into health services planning, resourcing and evaluation.
Theoretical framework guiding implementation research

**Context**
- Health System context: Staffing, workload, Essential equipment tools and supplies availability, Essential medicines availability, geographic access, financial access, sociocultural access
- Macro context: Social, Cultural, Political, Economic, Demographic

**Intervention**
- Sustainable energy provided to health facility

**Process**
- Uninterrupted (24 hrs) power availability
- Use of power in MNCH service delivery
- Improved readiness & quality of MNCH services

**Outcomes**
- ↑ community demand
- ↑ MNCH service coverage
- Improved staff satisfaction & motivation
Indicators studied

Changes to service delivery (SDG 3)
- Number of deliveries
- Number of ANC visits
- Availability and use of equipment (e.g., Laptops, mobile phones, vaccine fridges, fans, and any other electricity-dependent equipment that enhances service delivery)

Changes to community access & satisfaction (SDG 1 & 5)
- Perceived accessibility
- Patient Satisfaction

Decent work for health providers (SDG 8)
- Changes to provider living situation
- Changes to provider attraction, retention, satisfaction
- Changes to provider communication capabilities

Climate impact (SDG 7 and SDG 13)
- Replacement of older, unreliable technologies with PV (did it replace another energy source or was there nothing at all)
- Projections around whether PV is a feasible and sustainable solution for more health facilities to be connected to instead of traditional energy sources
Findings: Changes to service delivery
Ghana

Average annual deliveries per facility

Baseline: 20
Endline: 35
Increase: 59%

Average monthly ANC Coverage per facility

Baseline: 60
Endline: 74
Increase: 15%

Uganda

Average monthly live births per facility

Baseline: 20
Endline: 34
Increase: 34%

Average monthly ANC Coverage per facility

Baseline: 60
Endline: 42
Decrease: 18%
Laptops

Official Mobile Phones

Fetal Dopplers

Functional vaccine Fridges

Number of facilities with energy-dependent equipment at baseline: Ghana
Official Mobile Phones

Laptops

Fetal Dopplers

Functional vaccine Fridges

Number of facilities with energy-dependent equipment at endline: Ghana
Laptops

Official Mobile Phones

Fetal Dopplers

Functional vaccine Fridges

Number of facilities with energy-dependent equipment at baseline: Uganda
Laptops

Official Mobile Phones

Fetal Dopplers

Functional vaccine Fridges

Number of facilities with energy-dependent equipment at endline: Uganda
Findings: Community satisfaction
## Accessibility & Satisfaction

<table>
<thead>
<tr>
<th>Client Survey</th>
<th>Baseline (%)</th>
<th>Endline (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Can communicate with the health worker at the nearest HF (N=432)</td>
<td>67.6</td>
<td>55.0</td>
</tr>
<tr>
<td>Able to access a health worker at night (N=500)</td>
<td>77.8</td>
<td>93.2</td>
</tr>
<tr>
<td>Delivery services offered at night (N=432)</td>
<td>88.6</td>
<td>99.2</td>
</tr>
<tr>
<td>Can recommend other mothers to seek MCH services from nearest HF (N=187)</td>
<td>76.5</td>
<td>98.4</td>
</tr>
<tr>
<td>Can deliver at the nearest health facility (N=432)</td>
<td>81.7</td>
<td>89.2</td>
</tr>
</tbody>
</table>
Findings: Health providers
<table>
<thead>
<tr>
<th>Health Provider Survey</th>
<th>Baseline</th>
<th>(%)</th>
<th>Endline</th>
<th>(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Have adequate lighting to perform night tasks in the maternity department</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Always</td>
<td>12.5</td>
<td>92.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sometimes</td>
<td>37.5</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never</td>
<td>50.0</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not applicable</td>
<td>0.0</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Able to access energy/power (e.g. power sockets for charging other devices)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Always</td>
<td>16.7</td>
<td>96.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sometimes</td>
<td>16.7</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never</td>
<td>66.6</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Had an accident occurring due to the energy/power situation in the last 12 months</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sometimes</td>
<td>29.2</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never</td>
<td>70.8</td>
<td>100</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Improvement in quality of work and self-efficacy of providers

... If the health worker had to attend to a client, he or she cannot practice a very good infection prevention because you can’t see and especially if you are alone to work with just one person in the facility, you have to handle your torch and handle the client too at the same time. It is not the very best. So, the solar availability has really had an impact by addressing this difficulty for the providers and consequently on infection prevention (District Director, Ghana)
Improvement in quality of work and self-efficacy of providers

... In the past when Kpanashie [healthcare facility] did not have electricity, the healthcare providers stored their vaccines and medicines in the nearest community and picked them up when they needed them. So, when you go there to vaccinate your child, they would tell you unless they had a certain number of babies. And since at the moment your baby is the only one there, you should go and come back at a later date... (Mother, Ghana)
Hospitable living quarters & health provider quality of life

for example, a midwife has accepted posting to the place. As soon as community members had this information, they have volunteered to build a small staff accommodation for the midwife in order to make her stay more comfortable” (Disease control officer for Soo CHPs Ghana).
Hospitable living quarters & health provider quality of life

The safety concerns staff had in the past, has also improved. Now they feel they have better control over their environment from intruders such as dangerous reptiles who live with us all the time. This is because they can see better in their hospital environment with the illumination of the facility to identify any dangerous reptiles like that wonder into the facility compound and rooms. (Disease control officer, Ghana)
Findings: Unintended consequences, implementation challenges & Sustainability
Unintended Outcomes

• Charging capabilities
  • Intended: enhance health worker access to communication tools & create potential for mhealth
  • Unintended: + community integration, - privacy concerns
Unintended Outcomes

• Charging capabilities
  • Intended: enhance health worker access to communication tools & create potential for mhealth
  • Unintended: + community integration, - privacy concerns

• Improved lighting
  • Intended: increase hours of operation, improve adherence to infection control protocols, enhance security
  • Unintended: drive away pests (bats etc) & reclaim buildings
Implementation challenges, opportunities & sustainability

• Coordination between MoH and MoE
• Combined effect of multiple interventions
• Criteria for site selection & increased demand
• Longevity of infrastructure: temporary, dilapidated, infested buildings, inadequate latrines affecting ability to install PVs
• District and regional level turnover of staff
• Community expectations set by community engagement activities vs realities of health providers
• Appropriateness of equipment used & effect on replacement
• Fidelity to intervention design for maintenance
Study limitations

• Data reliability
• Short timeframe
• Impact of other ancilliary services and interventions
• Changes to health system plans & delivery models
• Provider expectations vs observed realities
Summary

↑ 24 hr availability of services
↑ facility-based deliveries
↑ user satisfaction
↑ health provider satisfaction
↑ access to communication and reporting tools
↓ accidents

Potential for future health systems strengthening measures that are reliant on power
Thank you

Principle Investigators

- Dr. Alberta Amu, Lucy Yevoo, Prof Irene Agyepong
- Dr. John Ssempebwa, Dr. John Bosco Isunju
<table>
<thead>
<tr>
<th>Specific Objective</th>
<th>Study Question</th>
<th>Variables/indicators</th>
<th>Data Collection Methods</th>
</tr>
</thead>
</table>
| (1) To monitor the pathways, barriers and facilitators in implementation of the UNF/DFID intervention “electrification of health facilities with solar systems”; | What are the pathways, barriers and facilitators to integration of sustainable energy solutions in health facilities? | -Descriptive narrative of how the project was done, including facilitators and barriers to implementation  
-Qualitative data indicating other contextual factors that influence the process and readiness to provide energy-sensitive MNCH services at the facility | -Key informant interviews with contractors, donors, health managers  
-Observation of training of health workers on use of solar systems  
-Desk review of implementation documents |
| (2) To explore the impact of electrification of health facilities with solar systems on service delivery for maternal and newborn health, using routinely collected data; | How and why does the electrification of health facilities with solar systems affect/influence maternal and neonatal service delivery, and in particular readiness and quality of MNCH at health facilities? | Quality and readiness indicators:  
-skilled attendance at deliveries  
-number of pregnant women making at least 4 ANC visits  
-increased # of children attending growth monitoring and promotion  
-Number of neonates receiving at least a quality PNC by the end of the seventh day after delivery  
-Number of mothers receiving at least a quality PNC visit by the end of the seventh day after delivery  
-No of facilities providing 24 hour services  
-% Availability of functioning key equipment and supplies by facility.  
-% availability of key MCNH services by facility, by day and night | -DHIMS2 extraction form  
-Facility assessment questionnaire (SARA)  
-interviews with health workers |
| (3) To describe how and why electrification of health facilities with solar systems affects demand for, utilization of and satisfaction with maternal and newborn services by mothers within the health facility catchment area | How and why does electrification of health facilities with solar systems affect/influence community uptake of MNCH services, and overall coverage of services within the health facility catchment area? | %-satisfaction of mothers who utilize the service  
-Qualitative data indicating satisfaction with services and why  
-changes in health-seeking behavior  
-coverage rates | -Interviews with mothers  
-Community members focus group discussions |