Qualitative Research: Enhanced Capacity of Health Workers

Through observations, surveys, and more than 1,200 in-depth interviews, we have evidence that the Solar Suitcase significantly improves the capacity to conduct basic and comprehensive emergency obstetric care, improves health worker morale, and increases patient health-seeking behavior[i]. The introduction ofoverhead LED lights, headlamps, phone chargers and fetal Dopplers to energy-deficient health centers enables health workers to work more effectively and efficiently.

Study Design: Qualitative analysis of health provider experiences in Solar Suitcase-equipped facilities.
Sample Size: 1,200 health workers across 11 countries over a 10-year period
Tools Used: In-depth interviews using We Care Solar Questionnaires
Analysis: Qualitative data coding using ATLAS.ti, codes analyzed for recurrent themes
Key Findings: Health workers reported health care improvements in the following areas:

Capacity to Conduct Obstetric Care

1. Ability to provide obstetric and newborn care 24 hours a day and monitor fetal wellbeing
2. Reduced delays in the provision of core signal functions of Basic and Comprehensive EmergencyObstetric Care (WHO)[2] such as treatment of eclampsia and hemorrhage
3. Improved ability to perform emergency c/sections and other surgeries
4. Improved ability to locate, measure and administer essential medications (e.g. oxytocin, MgSO4)
5. Reduction in delays and unnecessary patient referrals resulting from inadequate lighting
6. Greater adherence to HIV treatment protocols at the time of delivery (weighing babies, measuring andadministering Nevirapine to HIV-positive patients)[3]

Capacity to Conduct Neonatal Care

7. Improved capacity to assess fetal well-being and refer cases of fetal distress for c/section
8. Improved ability to examine newborns, assess for asphyxia, locate and use life-saving equipment atnight (e.g. neonatal Ambu-bag)

Infection Control and Safety

9. Improved ability to maintain good health facility hygiene and clean up after deliveries
11. Reduced personal risk of contamination compared to holding cell phones in mouth as illumination andusing fetal Doppler in standing position rather than bending close to patient with fetoscope
12. Reduced risk of fire and injury to self and others compared to use of candles or kerosene lanterns

General Medical Care and Communication

13. Improved patient-provider communications during labor when cell phone not held in mouth
14. Improved emergency communication for consultations and referrals of patients to hospitals
15. Improved ability to provide medical documentation, including use of labor partographs
16. Improvements in safety, less injuries, and greater ease of mobility around facility at night
17. Improved health worker confidence and morale.

In addition to improved quality of care, the Solar Suitcase increased the demand for health services in rural settings, particularly at night. This was particularly true for impoverished mothers who previously were required to pay for candles, kerosene, or batteries to support obstetric lighting during labor. After health facilities received the Solar Suitcase, mothers were more likely to seek skilled obstetric care. Health workers reported up to 300% increase in nighttime deliveries after installation when compared to baseline.

Summary of Health Worker Reports

Aspect of Quality Care	Key Component of the Solar Suitcase
Clinical Environment, Hygiene, and Safety - No candle wax burns - No risk of fires - Infection control - reduces contamination of bloods and fluids - Able to keep health facility clean	LED lights Headlamps
Clinical Care - Hands are free (no need for handheld candles, lanterns, torchlights) - Able to orally communicate (holding cell phone or other light source by mouth is not necessary) - Greater confidence; no longer fear night-time duty - Bright task light to identify complications and conduct procedures	Reliable electricity LED lights Headlamps Phone charger Fetal Doppler
Timeliness of Care - Do not have to delay critical procedures until morning when sunlight is available (suturing episiotomy, administration of IV medication, c/sections) - Can refer immediately if needed using charged phones - Can call a doctor and back-up support if needed - Can call family members of patients if needed - Can get a second opinion about a medical condition - Can listen to FHR continuously as needed - Provision of Nevirapine for off-spring of HIV positive patients	LED lights Headlamps
Improved Ability to Conduct Critical Procedures - Inserting intravenous lines (IVs) - Identifying and suturing vaginal tears, cervical tears, vulvar tear	LED lights Headlamps

Improved Visibility for Diagnostic and Routine Care - Can observe patients (mother and newborn) simultaneously - Can document labor progress via partograph - Can read medical records, write progress notes - Can insert catheter to drain bladder - Can clean, dry, and examine baby after birth - Can read medicine labels, measure and administer medication - Can appropriately measure vital signs and utilize equipment requiring careful placement (resuscitation mask, blood pressure cuff, etc.)	LED lights Headlamps
Fetal Monitoring - Diagnose fetal distress (bradycardia or tachycardia) - Diagnose fetal demise - Confirm fetal viability - Improved bonding between mother and baby, and father and baby	Fetal Doppler
Incentive to Come to Health Facility - Mothers do not have to bring their own lighting for delivery or pay for batteries, kerosene, candles - Mothers feel more confident in the health staff - Mothers want to hear the heartbeat of their babies	Reliable electricity LED lights Headlamps Phone charger Fetal Doppler
Patient Experience - Greater satisfaction with care - Mothers can see and breastfeed their babies - Less fear of night time deliveries - Ability to charge phones and call relatives - Ability to charge radios, computers, tablets for patient education/entertainment	LED lights 12VDC Charging

[1] Stachel, L. *Where There is No Light: A Mixed-Methods Exploration of Quality of Obstetric Care and Energy Access in Low and Middle Income Countries and the Impacts of a "Solar Suitcase" Intervention* 2020

[2] https://www.who.int/reproductivehealth/publications/monitoring/9789241547734/en/

[3] Reported by National Aids Council, Zimbabwe in 2018.