Solar Tablets for Mobile Outreach

A Case Study in leveraging innovative mHealth solutions to improve young people's sexual and reproductive health and rights (SRHR) in Uganda

Rapid advances in mobile technology present new opportunities to improve global health and universal access to SRHR. Our solar tablets are an innovative mHealth solution to improve access to SRHR information and enhance service delivery.

In Uganda, peer educators, Village Health Teams (VHTs) and community health extension workers are part of a constellation of mobile outreach services that complement stationary local health systems. Mobile outreach services bring information, services and supplies directly to community members, and address barriers and inequalities in access to healthcare by providing services in hard-to-reach, rural and marginalised communities.

Throughout Uganda, consistent energy supply is a challenge. Regular blackouts and load shedding[1] are common in rural areas. Yet, Uganda is abundant in renewable solar energy resources with a high national adoption rate. Across the country, solar energy is primarily being used for off-grid electrification of rural communities and actively being used in homes, schools, and clinics. Solar energy has brought benefits to education, gender equality and health care.

In 2019 – 2020, we implemented a Proof of Concept to evaluate an mHealth solution to improve the provision of SRHR information, while addressing energy concerns and leveraging advances in digital technology. We wanted to develop a bespoke product that mobile outreach workers could carry with them to deliver digitised SRHR information in under-served and hard-to-reach communities. We build on the evidence that mobile outreach is a proven high-impact intervention to improve SRHR outcomes of poor and marginalised women and girls.[2] Together with Uganda's foremost SRHR provider Reproductive Health Uganda (RHU) and Challenges Uganda, we worked to design, pilot and implement a solar tablet that is locally relevant with a clear objective of reducing the material load of mobile outreach services.

Adolescent SRHR Indicators, Uganda 2019

66%  of Ugandans are under **24** years old

40% of unmarried sexually active women age 15-24 use modern contraception

1 in 6 young women will be pregnant by the age of 20

	first have sex at	marry at	first use contraception
Urban Women	17 years old	20 years old	21 years old
Rural Women	16 years old	19 years old	23 years old

Uganda at the centre of a mobile revolution

MobileMoney is REVOLUTIONISING the movement of money

Uganda has one of the **highest adoption rates** of solar energy[3]

Affordability & skill remain the top barrier for mobile internet use in Uganda[4]

1. Load shedding is a deliberate shutdown of electric power to prevent demand strains.
2. High-Impact Practices in Family Planning (HIPs). Mobile outreach services: expanding access to a full range of modern contraceptives. Washington, DC: USAID; 2014 May. Available from: http://www.fphighimpactpractices.org/briefs/mobile-outreach-services
3. Uganda National Renewable Energy and Energy Efficiency Alliance (UNREEEEA).Overview of the Uganda Energy Sector. Kampala: UNREEEEA, 2020 Available https://unreeea.org/resource-center/overview-of-the-ugandan-energy-sector/#:~:text=The%20average%20solar%20radiation%20is%205.1%20kWh%2Fm2%2Fday%20and,is%20due%20to%20the%20location%20near%20the%20equator.
4. GSMA. The State of Mobile Internet Connectivity 2020. GSMA Association: London, UK 2020 https://www.gsma.com/r/wp-content/uploads/2020/09/GSMA-State-of-Mobile-Internet-Connectivity-Report-2020.pdf

Proof of Concept

Our Proof of Concept aims to understand if a solar tablet is an effective and feasible tool to complement outreach services and increase access to SRHR information. We wanted to verify a real-life application and confirm if the tablets have viability and feasibility for mobile outreach workers.

Since 2011, SafeHands has worked to identify digital solutions to provide Information, Education and Communication (IEC) materials to hard-to-reach and off-grid communities. From 2011 – 2016, over 300 of our solar-powered media players were distributed in rural areas of Ethiopia. Carried in a backpack, midwives and health extension workers could screen health education films in hard-to-reach areas and charged by portable solar panels when required.

This Case Study provides the foundation of our Proof of Concept in developing a user-driven design of a bespoke solar tablet that digitises IEC materials to complement the delivery of SRHR outreach services. It serves as a primer for those interested in the key basics for building and developing an mHealth digital solution.

In 2019 – 2020, we drew on our experience and lessons learned to enhance a new generation of solar tablet that leverages rapid advances made in mobile technology. We wanted to identify a new mHealth solution that could be scaled-up to complement mobile outreach services across our programmes. With technical oversight from Challenges Uganda, SafeHands and RHU implemented a Proof of Concept for next-generation solar tablets. Our Proof of Concept proved a small-scale visualisation to verify a real-life application to understand if the solar tablets were feasible, functional and scalable.

Our solar tablets are:

- Retrieved by peer educators and VHTs at their nearest associated clinic;
- Carried in a backpack while conducting mobile outreach services in hard-to-reach communities;
- Hardware includes a portable tablet, a power bank, an emergency portable solar charger and backpack;
- Software includes digitised IEC materials and a digital Monitoring and Evaluation tool;
- Returned and charged at a docking station that makes use of the clinic's solar energy.

Phases in Ask RHU practical experiment, 2019 - 2020

Step 1 - Demonstrate the need for the product

- The feasibility of our concept by understanding the needs, challenges, opportunities and gaps of mobile outreach services through interviews with RHU, service providers, peer educators & VHTs.

Step 2 - Identify the right solution

- Identification of possible digital products based on safety, robustness, user friendliness, ease of procurement, market availability of product components and cost-effectiveness.

Step 3 – Create a prototype and test it

- Consideration of a range of solar charging models within specifications of RHU clinics.
- Design and implement a user-centred pilot to test the solar tablet's performance in mobile outreach services.

Step 4 – Gather and document feedback

- Evaluate key metrics and findings from the delivery of user-centred pilot
- Review of user feedback from user-centred pilot on experience, reaction and other details.

Step 5 – Conclusion

- Verify usability and feasibility of solar tablets
- Conclude on evidence and make recommendations on expanded use and potential for scale up.

Real-World Application

The best way to test the feasibility of our solar tablets was to get them into the hands of the women and men that provide mobile outreach services. We partnered with peer educators and VHTs to evaluate the benefits, challenges and risks in supporting their everyday work. Would the tablets be acceptable? How easy would they be to use? How would they fare in the rugged and off-grid communities?

The user-driven pilot aimed to understand our users' customer segment and create an appropriate product that meets their needs. By involving mobile outreach workers to apply the solar tablets in their daily work, we wanted to gain a deeper understanding of their needs, and the wider community's; and design a product and service that is needed and appropriate.

Major functional elements include:

1. Four prototypes were piloted as part of routine mobile outreach services.	The pilot centred on the routine delivery of mobile outreach services associated with RHU's Fort Portal clinic in southwestern Uganda. Four different prototypes – one tablet with four possible chargers screened digital IEC materials to small groups in hard-to-reach communities. The prototypes included four different charging options including solar and hand-crank power banks.
2. Two cohorts of 15 mobile outreach providers tested the prototypes over 20 working days.	Two cohorts included 10 peer educators and five VHTs. Delayed timing between the two cohorts allowed us to respond to any unexpected challenges which arose. Each cohort was provided with a half-day training to overview the basic functionality of the tablets and ways to include them during outreach sessions.
3. Mobile outreach providers reached over 32,000 people with SRHR information using our prototypes.	Peer educators reached 1,032 people including 586 women. VHTs reached 1,051 people, including 730 women. Most people reached were mainly young people between the ages of 20 - 30 years old. Digital IEC materials were screened on the tablet including a health education film, digital manual, survey and Monitoring and Evaluation survey.
4. Collection of data and key indicators was essential in gaining insight into the feasibility and areas of continuous improvement.	Key indicators and data were collected throughout the pilot using software on the tablet. Key metrics included beneficiary reach disaggregated by age and gender, performance of hardware functionality and feedback and recommendations on ease of use, challenges and improvement.

Main Findings and Next Steps

Our Proof of Concept confirmed that our solar tablets are a practical and acceptable mHealth solution to enhance the delivery of mobile outreach services. While user feedback confirms the real-life application, data and findings are essential in identifying areas for continuous improvement, and next steps towards scaling-up the use of our product and service.

1. **95% of end users reported the tablets to be an acceptable tool to complement mobile outreach.** Peer educators and VHTs reported that the tablets were easy to use, light-weight, and complemented their work. One peer educator reported the tablets: "make my work as a peer educator easier because I referred to the information from time to time." VHTs reported the novelty of digital IEC materials intrigued communities and made learning interesting.

2. **The power banks were not all equally adequate.** Our four different power bank options proved to be contentious and problematic. The hand crank-only charger was difficult to use and impractical. The solar panels on the power banks were too weak to charge a tablet. The most-liked power bank was rated highest because it held the most battery life, but even this was considered to be too heavy. This shifted our understanding to finding a powerful light weight option rather than a completely self-sufficient option. Moreover, the tablet itself should be optimised to improve battery life which points us to more customisable applications for the tablets.

3. **Weighing up the cost-effectiveness of the product.** Significant efforts were made to keep the product cost at around US$150 per unit. As we assessed different prototypes, many products readily available on the market did not wholly meet our requirements and articulated needs. While the hardware cost may be low, we need to consider import and duty fees, transportation, tech support and consistency of supply. Continued efforts will need to be made to identify a reliable supplier, with low overhead costs that does not compromise on quality.

4. **Need for real-time data.** During the first cohort, data collection was difficult for peer educators to report and project managers to review and analyse data. We pivoted to a new Monitoring and Evaluation tool in time for the second cohort. VHTs used Kobo Toolbox as an offline tool which uploaded information easily and provided real-time data to track key indicators. This proved to be easier for VHTs in updating the required daily and weekly surveys and ensured progress could be reviewed as the pilot progressed. The capacity for real-time data collection will need to be central to our scale-up to ensure ongoing Monitoring and Evaluation of key indicators and results, as well as areas of continuous improvement.

5. **Content matters.** The focus of our pilot was on the design of a prototype that focused on hardware which were robust enough for the setting and use. To truly understanding the impact of the solar tablets on mobile outreach, we will need to invest in the creation and dissemination of strong IEC materials that are locally appropriate and available in local languages. Testers reported that although people were more engaged with the videos, they needed to translate as the videos were not in local languages. Therefore, future work will need to consider how content can adapt to different local languages.

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