

**Lake Tanganyika Floating Health Clinic
Communications Network Expansion and Electronic Medical Record Project
Democratic Republic of Congo – October 2014
End of Project Report**

I. Context and Justification of Project

Following the successful 2012 High Frequency (HF) radio pilot in Moba Territory, DRC, the LTFHC engaged in the development of an HF radio based data network and Electronic Medical Record (EMR) system to address the void in communications infrastructure in the Lake Tanganyika Basin. The development of these systems was informed by a technical surveillance of potential sites in Tanzania and DRC, with specific attention paid to successfully incorporating existing infrastructure and anticipating any technical challenges, as well as to determine general suitability of the site and the aptitude and enthusiasm of the personnel for incorporating new technology. Factors such as community ownership and involvement in health care facilities were also taken into account. The majority of the sites selected were noted to have no pre-existing electrical infrastructure, and therefore installations were designed to be self-sufficient in terms of connectivity and to utilize solar power. Due to the scarcity of local technical resources, the vast majority of equipment had to be imported from overseas. This required detailed advanced planning and analysis, including anticipation of all necessary tools and cabling requirements.

The new technology was beta tested in a pilot installation, which was carried out at five rural health centers in the Nkasi District of Tanzania during November 2013 and completed during a subsequent trip in January 2014. In October 2014, we expanded this data network to the DRC side of the lake. This report provides further detail on these efforts.

II. Activities of Project

Activities were funded by The Crown Family and private donors, and carried out in cooperation with the provincial and national MOH, the District Medical Offices in Kalemie and other local governmental bodies and individuals. In order to complete this project, the LTFHC partnered with [iilab](#) on hardware and software development, as well as in-the-field deployment. We also partnered with [Team Rubicon](#), who provided us with two additional field staff trained in HF radio set-up to assist with deployment and health care worker training. The LTFHC was thus able to successfully expand its communications infrastructure to 8 remote locations and the district hospital in Kalemie Territory of the DRC, six of which included the EMR platform and three of which were voice only communications systems, through the following steps:

Health Care Worker Training

The project commenced with the training of 5 health care workers and 3 administrative staff in basic computer skills, followed by an introduction to the EMR system over a two-week period hosted by the LTFHC at the Kalemie Hospital in the DRC. This training, performed in a combination of French and Swahili as is spoken in the region, involved the following:

- **Training methodology**
 - Topic presentation by facilitators
 - Facilitator engagement of participants through use of the Socratic method
 - Cementing of skills through performance of practical tasks such as typing exercises
 - Distribution of training handouts to the participants for easy follow up

- **Topics covered**
 - Introduction to general use of the computer
 - How to create a Microsoft word file
 - Introduction of the EMR
 - How to complete different patient intake forms created by the system
 - How to share reports with the relevant District structures

In general, training proceeded in a very patient, meticulous fashion given that these health care workers had never used computers before. Careful attention was paid to ensure that each person was able to succeed. Our local staff reports that several health care workers made a point of saying that they were grateful to learn such widely applicable skills and eager to put the EMR to use to improve patient care.

Installations

Our technical team then successfully completed equipment installations at each health center, which was complemented by additional on-site provider instruction.

As noted above, the majority of the sites selected were noted to have no pre-existing electrical infrastructure, and therefore installations were planned to be self-sufficient in terms of energy and connectivity requirements. The LTFHC locally sources equipment whenever possible and was able to procure solar panels and batteries in Dar es Salaam, greatly reducing the cost of airfreighting these weighty items. The vast majority of equipment had to be imported from overseas, which required advanced planning and analysis, including anticipation of all necessary tools and cabling requirements

All installations were performed without notable difficulty and involved active participation from the community in the form of assistance with antenna mounting labor and materials. Radio voice communications were confirmed at all sites following installation. At EMR sites, data transfer functionality was also confirmed.

Installation equipment was comprised of a Codan HF radio, High speed HF data modem, folded dipole antenna, three 100-watt solar panels and two 200Amp 12-volt batteries, a Mini server unit, EMR software and Lenovo laptop computers at the following locations:

- **Katondo (population served 5,971)**
 - Tucked up against the bottom of a cliff face, this was the most challenging installation in terms of signal quality and reception. Some repositioning and adjustment of the antenna was required in order to establish communication but thanks to the assistance of the community, who helped plant poles, this installation was completed successfully.
- **Katombo (population served 5,986)**
 - The community at Katombo was incredibly helpful, with the village leaders taking an active interest and marshalling the community to assist us in any way possible and this installation was completed in record time. There were no problems or challenges with this installation and a communications check with Katondo on completion confirmed a successful installation.
- **Kimena (population served 6,172)**
 - This facility is a bit of a hike from the beach but the community came out in large numbers to welcome us on the beach and assisted in unloading the boat and carrying all the equipment up the hill to the clinic. Again the community played an active role in assisting with the installation and provided poles for mounting of the antenna. Some data transfer issues were encountered and the team worked late into the night trouble-shooting and ultimately the problem was successfully resolved.
- **Kitoke (population served 6,043)**

This facility is also some distance from the beach and again the community was eager to assist, leading the way through the maze of huts. This installation was challenging in terms of the facility's location and some adjustment and repositioning of the antenna was required due to the topography but was nonetheless successfully completed.
- **Wimbi (population served 8,674)**

Due to transportation issues our international team in its entirety was unable to reach Wimbi. However, our local staff managed to get there a few days later and successfully installed the system. We were able to communicate with them via radio from our Kigoma, Tanzania office to confirm functionality of voice communication and of the EMR system.

Centralized data collection technology was installed at Kalemie General Hospital, which serves a total population of 462,740.

- Kalemie Referral Hospital houses the offices of both Kalemie and Nyemba Health Zones and is the administrative and logistics hub for primary health care facilities along the lake within Kalemie Territory in the DRC. The two Health Zone offices were linked wirelessly to the EMR server in order to receive reports transmitted from remote facilities. Kalemie has the benefit of electrical supply and 3G mobile network coverage, although an Uninterrupted Power Supply (USP) and battery backup system was installed to maintain system functionality during outages. This was an extensive installation due to the layout of the facility and proximity of the two offices, and thus required three days to complete.

Solar-powered HF radios were successfully installed at the following locations:

- **Bilila (population served 6,355)**
- **Rugumba (population served 7,317)**
- **Kabanga (population served 6,316)**

III. Project Results

Experience and good planning meant that the logistical delays which occurred during the pilot in Tanzania were avoided in the DRC. For example, via one of our DRC employees with extensive experience in shepherding equipment through customs, we were able to significantly cut down on transit times.

The hardware performed as expected, despite some minor damages to equipment during shipping for which the team had prepared and had replacement parts on hand and installations were successfully concluded. Some minor reprogramming and reconfiguration of systems was required as a result of changes which had occurred onsite between surveillance and installation, however these issues were easily resolved by iilab.

Key project results include the following:

- Voice communication brought to 8 remote locations that have no telecommunications services
- Data transfer technology brought to 5 remote locations
- Total remote population served: 52,834
- Remote lakeside health centers are now far better connected by voice and data communication to the Ministry of Health and Kalemie General Hospital

- 5 health care workers and 3 administrative assistants were trained in computer skills and EMR use
- Titular nurses and other health care workers have the knowledge needed to operate the radios and submit monthly MOH reports as required

IV. Project Challenges

- Continued instability in the Eastern DRC means that our team will likely have to work harder with local health care workers to ensure security of the equipment over the long term
- Teaching computer skills to the health care workers in DRC proved to be more challenging than in Tanzania, as they were slower to pick up new skills. More extensive instruction than anticipated was necessary. Thus, the LTFHC has created a plan to engage in quarterly refresher training when the health care workers are already scheduled to gather together in Kalemie to meet with the Ministry of Health. LTFHC is also planning for local staff to gather the health care workers originally trained for a refresher computer course coming up shortly

V. Monitoring & Evaluation

- Evaluation of Progress:
 - LTFHC recorded reporting rates and numbers of patients seen from participating health centers prior to installations to determine a baseline for comparison
 - LTFHC will conduct a 6-month midterm survey to monitor progress and evaluate quarterly thereafter
- Measurable Objectives:
 - LTFHC expects to see the following results:
 - Expect on-time reporting to increase to at least 80% in DRC health centers with new HF radios
 - Expect to see a 20% increase in number of patients seen after installations

VI. Next Phase

Research & Development

- LTFHC software consultants are currently working to make the EMR software more user-friendly

- LTFHC and its technical team are now in a position to take what we have learned from the EMR pilots in Tanzania and DRC and perform critical improvements to the technology to make the EMR as efficient as possible, as well as accomplish adaptation of less expensive equipment to the project's needs

Expansion

- LTFHC will continue expanding the HF voice-only network to new locations in Tanzania and DRC in 2015, further connecting rural health centers that suffer greatly from being outside the reach of GSM networks

VII. Partners and Collaborators

Funders:

The Crown Family
Private Donors

In Cooperation With:

Provincial and National Ministries of Health
District Medical Office in Kalemie
iiLab
Team Rubicon

VIII. Budget

Description:	Amount:
Equipment (includes EMR software development, hardware integration, clearance and transport fees)	\$ 151,284
Local and International Team Transport, Lodging and Meals	\$ 28,050
Health Care Worker Training & Advance Trips (includes transport, meals, supplies)	\$ 13,035
TOTAL BUDGET	\$ 192,369