Lake Tanganyika Floating Health Clinic
Communications Network Expansion and Electronic Medical Record Project
Nkasi District, Tanzania – October/November 2013
End of Project Report

I.   Context and Justification of Project

Communications options in the Lake Tanganyika basin are extremely limited due to the remoteness of the area, lack of GSM networks, terrain profile, and long distances between locations. Health centers in the Lake Tanganyika Basin are currently unable to call for emergency medical assistance, seek basic health-related guidance or submit reports required by their Ministries of Health (MOH). They are also unable to collect and transmit vital public health and epidemiologic data that could aid in containing infectious disease outbreaks, prioritizing particular diseases or health problems, and obtaining much needed resources.

Following the successful 2012 High Frequency (HF) radio pilot in Moba Territory, Democratic Republic of Congo (DRC), the Lake Tanganyika Floating Health Clinic (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 this system was informed by in-depth, technical surveillance of potential sites conducted in Tanzania in December 2012 and in the DRC in March 2013, with specific attention paid to successfully incorporating existing infrastructure and anticipating any technical challenges, as well as determining 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.

During the surveillance trips, the LTFHC had discussions with health center staff regarding the challenges they face in using and maintaining handwritten reports and medical records. It was concluded that all lack road access, electricity, phone service, running water, and employees with any computer literacy. Records of infectious disease cases are kept in hand written paper logs, making organization and modification of data extremely challenging. Once reports are completed, there is no easy or efficient way to communicate the results to the MOH. Individual patient records are equally challenging. Each patient must purchase a notebook in which to keep their own medical records, which is easy to lose and often indecipherable.   For these reasons, these locations remain particularly vulnerable to inaccurate epidemiologic data collection, sub-standard patient record keeping, administration of poor quality health care, and inadequate supply chain management of medications and consumables.

The LTFHC's EMR system will enable health care workers to record, and then easily and efficiently review patient visits, test results, and diagnoses, which aids in clinical decision making. For the first time, employees in these rural locations will be able to electronically share a patient's record with more experienced providers at the regional hospital and

obtain feedback on the optimal clinical course of action. This will result in higher quality care for patients, particularly those with more severe ailments. Patients will also benefit from better reporting. With consistent, on-time transmission of tallies of communicable disease cases to the MOH, potential epidemics can be recognized and contained much more efficiently.

II.   Activities of Project

Funded by Hewlett Packard (HP), The Crown Family and private donors, and in cooperation with the provincial and national MOH, the District Medical Office in Namanyere and other local governmental bodies and individuals, the LTFHC expanded its previous work in communications infrastructure to 5 locations in Nkasi District, Tanzania, including the critical addition of an EMR platform, by undertaking the following activities:

Health Care Worker Training

The project commenced with the training of 12 health care workers in basic computer skills, followed by an introduction to the EMR system over a two-week period hosted by the LTFHC at the Kirando Health Center in Nkasi District. Our technical team then successfully completed equipment installations at each health center, which was complemented by additional on-site provider instruction.

- **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

Installations

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. Due to the scarcity of local technical resources, the vast majority of equipment had to be imported from the US. This required detailed advanced planning and analysis, including anticipation of all necessary tools and cabling

requirements. Locally manufactured solar panels and batteries were, however, obtainable in Dar es Salaam, greatly reducing the cost of airfreighting these weighty items.

The LTFHC installed communications units, comprised of a Codan HF radio, High speed HF data modem, folded dipole antenna, a 60-watt solar panel and 12-volt battery, Mini server unit, EMR software and HP laptop computers at the following locations:

- **Izinga Clinic** (population served: 1,990)

    o This was the most remote, inaccessible and challenging of the installation sites. It required a three hour journey by boat as there are no existing roads. This was mitigated however, by community investment and enthusiasm. Villagers offered assistance in every aspect of the installation, including digging to plant an antenna mast and routing cabling. The village chief insisted on familiarizing himself with the new system, and school children swarmed the facility to interact with our team. Overall, the overwhelming commitment of the community resulted in the installation being completed in very short order.

- **Namansi Clinic** (population served: 5,172)

    o The team accessed Namansi via road, given strong winds and rough water conditions on Lake Tanganyika. Again, a very enthusiastic and helpful community was encountered at this location, thus expediting the installation. Time was spent rewiring an existing solar lighting system which had ceased to function, although new batteries are required and will be addressed at a later date.

- **Kirando Health Center** (population served: 60,000)

    o Kirando is a larger referral health center, at which the LTFHC has previously invested heavily in infrastructure and capacity building. An existing solar power system was upgraded and rewired during the course of the installation, providing power and lighting throughout the facility. This was also the most extensive installation, involving a much wider wifi network, eight notebook computers and internet uplink to provide a secondary network hub for the flow of data to the cloud based server. Consequently, this took two full days to complete.

- **Kazovu Clinic** (population served: 10,990)

    o Due to inclement weather on the lake and a lack of any road access, this installation had to be briefly deferred. However, the team managed to access the site on the following day, and a very supportive and engaged community helped to expedite the team's task. Kazovu was fortunate to have both an existing radio and solar lighting system, both of which were found to be in working condition. Thus, the upgrade of both was relatively

straight forward and completed in short order, allowing the team to finish prior to the onset of an impending storm.

- **Nkasi District Medical Office, Namanyere**

    o Some sixty kilometers inland of Lake Tanganyika, Nkasi Medical Center is the district's highest level facility and home to the local MOH hierarchy, to whom monthly reports are submitted by all health care facilities in Nkasi District. The medical center has an existing solar power and radio system, which was upgraded to receive reports and epidemiological data as well as provide a local wifi network to facilitate uploading of data to the cloud based server.

III.   Project Results

Despite challenges releasing equipment from customs and inclement weather delays, the hardware performed as expected 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 dealt with. This success is a testament to the LTFHC team's effectiveness in a challenging environment.

Key project results include the following:

- Kirando Health Center, Izinga, Namansi and Kazovu Clinics *(this comprises all locations originally planned for)*, serving over 75,000 lakeside residents, are now able, for the first time, to electronically record, then easily review patient visits, test results and diagnoses, allowing for more effective disease management

- Tens of thousands of Tanzanian citizens are now better connected to the Nkasi District Medical Office

- A total of 12 health care workers *(out of 12 originally planned)* were trained in basic computer skills and EMR use

- The production of user-manuals for laptops and the EMR were produced and distributed by LTFHC to each installation site

- 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

- The MOH has recently added new report forms, which we were unable to incorporate prior to the installations; LTFHC software consultants are currently working on integrating the new MOH reports into the system

- There have been some technical problems getting the computer to connect to the cloud in Kirando on a consistent basis; the team is actively looking into resolving these issues

- Administrative software functions allowing remote review of data collected in the health centers has not been working reliably; the team will conduct an onsite assessment in early 2014 to resolve these networking issues

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:
        - 20% improvement from pre-intervention baseline in reported accuracy, readability and organization of patient records
        - 20% increase from pre-intervention baseline in the number of patients seen each month
        - 80% increase from pre-intervention baseline in on-time reporting from participating health centers

VI.   Next Phase

- LTFHC is having a member of our local staff visit each of the remote health centers to review computer skills in December, 2013
- The entire LTFHC technical team will be traveling back to all installation sites in January-February 2014 to resolve any remaining technical challenges, including finalizing the sharing of digital information between health centers
- LTFHC software consultants are currently working on the new MOH reports

VII.   Electronic Medical Record Examples
Please see attached Exhibit A

VIII. Partners and Collaborators

Funders:
Hewlett Packard
The Crown Family
Private Donors

In Cooperation With:
Provincial and National Ministries of Health
District Medical Office in Namanyere
iiLab
Beach Petroleum

IX.   Budget
Please see attached Exhibit B

Exhibit A.
Electronic Medical Record Examples

New Patient

Lake Tanganyika
Floating Health Clinic
Records system

First Name:

Last Name:

Gender:
○ male   ○ female

Clinic ID:

Government ID:

HIV ID:

Phone:

What village do you live in?

Birth day: **Birth month:**   **Birth year:**   **Patient age:**   **Approximate age:**

Medication allergies:

Other Patient Notes

Patient Visit-Disease Diagnosis

Patient name: **sample patient**   Village:

Clinic: **Kirando**   Clinician: **Godfrey Mwinyi**   Date of Service: **Dec. 2, 2013, 7 p.m.**

Forms Needed for Patient Visit: **Disease Diagnosis** |

Chief Complaint:

| Other ⇕ |

If Chief Complaint not listed above, please write in:

| |

Symptoms:

- ☐ Other
- ☐ body aches
- ☐ chills
- ☐ diarrhea
- ☐ fever
- ☐ headache
- ☐ shortness of breath
- ☐ nausea or vomiting

Patient Visit-Reproductive Counseling

Lake Tanganyika
Floating Health Clinic
Records system

Patient name: **sample patient**   Village:

Clinic: **Kirando**   Clinician: **Godfrey Mwinyi**   Date of Service: **Dec. 2, 2013, 7 p.m.**

Forms Needed for Patient Visit: **Disease Diagnosis** | **Reproductive Counseling/treatment** | **Reproductive Counseling/treatment** |

Last Menstrual Period Date:

mm/dd/yyyy ▼

Menstrual History:

regular menses monthly

Total Number of Pregnancies:

0

Number of Full Term Deliveries:

0

Number of Preterm Deliveries:

0

Number of Miscarriages or Abortions:

Exhibit B: Budget

Description:		Amount:
Equipment (includes EMR software development, clearance and transport fees)	$	127,025
Local and International Team Transport and Lodging	$	28,550
Health Care Worker Training Expenses (includes transport, meals, supplies)	$	1,225
Advance Trips	$	1,200
TOTAL BUDGET	$	158,000