Haiti Telemedicine Project
Primary Healthcare and Health Education in Rural Haiti

Elana Rosenthal, Team Leader
Professor Andrew Jones, Faculty Advisor
Matthew Chapman, Team Member
Asher Feigenbaum, Team Member
Objective
To establish sustainable healthcare services offered by Primary Health Centers (PHC), in the rural communities of Haiti. Our proposal includes novel solutions utilizing solar power, and telemedicine with information technology. The strategy is early effective medical intervention by screening, diagnosing and treating diseases utilizing medically accepted standardized techniques. This approach will minimize:

- Logistical obstacles of geographical access.
- Create a resource information center for health, pre-natal, nutritional, maternal, hygiene, sanitation and prevention of non-communicable diseases (NCD).
- The quality of life, future economic growth, political and social stability of these communities will be enhanced by this project.

Overview of Project
Our long-term goal is to develop and build first level community-based healthcare facilities modeled after our successes to date with our clinic model in Duchity. This prototype facility will be scalable, economically beneficial, reduce morbidity, and provide critically needed healthcare needs to the most vulnerable population of Haiti.

This prototype facility can be replicated with an interconnected data base with other PHC’s in remote communities hundreds of miles apart or many hours away due to bad road conditions. Now they will be but interconnected and supervised by only one Telemedicine Physician. Each PHC can be assigned one day per week for seeing patients and the supervising physician can view patients from the main clinic in Port au Prince or consulting with specialists anywhere in the world with internet conductivity.

The roles of the PHC includes: comprehensive early detection screening, diagnosis, laboratory tests, vaccinations, distribution of medications, basic emergency care, create a data collection base for continual monitoring of follow up care and for epidemiological analysis to predict epidemics in their early stages, continuing education/training to empower and motivate healthcare workers and patients.

Process and Development
The land and building was procured in the rural community of Duchity, seven hours south of Port au Prince. Duchity is surrounded by 21 villages with an approximate indigenous population of 10,000. The clinic has a waiting area, initial intake and screening room with computer for telemedical/video communication, examination room, future laboratory, supply room, and bathroom. Solar panels and/or electrical generators will supplement electrical power for computers and laboratory equipment.

Medical staff consists of three (3) Telemedicine Assistants (TMA’s), two are nurses and the other is a nursing student. A physician, Dr. Joey Prosper has trained the TMA’s how to operate the clinic and the telemedicine equipment. In addition, Dr. Prosper has been responsible to obtain the necessary medications and equipment needed for a fully functional facility for this 10
week pilot that started early July, 2015.

**Our Successful Ten Week Pilot**

Our Dow Sustainability Grant proposed the establishment of sustainable, financially viable, and efficient healthcare access, in geographically isolated communities throughout Haiti. In ten (10) weeks we have delivered and exceeded this goal in developing a prototype Primary Health Center (PHC), utilizing novel solutions such as solar powered generators, telemedicine information technology and digital diagnostic equipment. Approximately 1000 patients in the community of Duchity have been screened, diagnosed and treated in our prototype PHC. Patients presented with mild to life threatening illnesses. Due to difficult terrain, geographic isolation, lack of physicians and nurses, these patients may have never been screened, diagnosed or treated.

Our strategy includes a multidisciplinary approach involving psychological, political, sociological, and cultural effective medical intervention, utilizing medically accepted standardized protocol. This has enabled us to minimize logistical obstacles, create an educational resource for pre and post-natal care, nutrition counselling, basic hygiene instruction, information concerning sanitation, and prevention of non-communicable diseases.

Our team has developed an infrastructure of on-the-ground resources with informational technology, combined with motivational psychology, delegating operational management to local communities, while collaborating with other non-profit volunteer organizations. Assessing this hypothesis has presented a myriad of challenges including: low rate of literacy; strong religious beliefs and historical cultural norms (Voodoo vs Christian); economic hardship; language barrier (Creole, French, English); access to connectivity and understanding of technology. Whether it is Ebola, Cholera, Tuberculosis or other potential pandemics, society as a whole cannot isolate itself from one unhealthy region. Applying this concept to our project, when someone in Duchity, Haiti sneezes, the entire world gets sick.

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<td>girls</td>
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Performance Metrics: **Energy, Community, Governance**

We have satisfied all required Dow Sustainability performance metrics:

1. **Energy** conservation/consumption utilizing available natural, efficient, environmentally safe and renewable resources.
2. Integration of **community** and social involvement by organizing and engaging indigenous human capital, while respecting local customs, traditions, labor and human rights; identifying and maximizing the capacity of local innovative and intellectual talent; creating a network and supply chain of management with simultaneous collaboration of other organizations;
3. Established **governance** with stable systematic monitoring, overseeing productivity and efficiency.

**Opportunity for Graham Institute, University of Michigan**

Our team believes there is a beneficial opportunity for the Graham Institute to further invest in our project. Providing additional capital will enable our team to continue our success creating long term value driven by large scale change. International recognition will be forthcoming for:

- providing sustainable health care regardless of geographical obstacles or financial ability
- increasing pre and post-natal survival rates
- diagnosis, treatment and medication distribution
- Reducing disability which compromises economic productivity.
- providing preventive health through education concerning safe drinking water and basic hygiene
- providing education about realistic nutritional plans to avoid malnutrition or diabetes

**Relationship to Haiti Action Plan Objectives**

The telemedicine program was implemented to de-concentrate and decentralize healthcare in Haiti. According to The Action Plan for National Recovery and Development of Haiti, this is a long-term goal of the Haitian Head of State. The Action Plan outlines the importance of connecting all regions of Haiti using a range of public services that are suited to economic and social development needs, particularly in terms of education and access to quality healthcare services. The telemedicine project does exactly that. It creates healthcare jobs in rural & remote regions; provides training and education in telemedicine for Haitian medical students and community healthcare workers; provides healthcare to rural communities that otherwise have little or no access to medical care. With current innovative technologies in telemedicine, indeed, this system may ultimately provide community healthcare equal to that available to residents in North America.

**Target Population and Geographic Location**- The telemedicine program will identify and target small, rural communities with little or no access to healthcare. These include the communities in South Haiti around Duchity and in North Haiti around L’Estère, A general manager, three telemedicine assistants and four clinic support staff will be hired in each community to operate the local telemedicine clinic. The telemedicine clinics will provide an effective, efficient, and sustainable healthcare program that is indigenous and operated by Haitian personnel.

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**Program Evaluation** - The following indicators will determine program progress:

- Establishment of a permanent telemedicine facility in each community, increasing access.
- Successful recruitment of telemedicine assistants and clinic support staff, creating jobs.
- Complete training of telemedicine assistants who will provide health promotion in their local communities.

Based on the success of LGA's free telemedicine project in L'Estere, where they have documented a 30% decrease in malaria, sexually transmitted diseases and other infections such as urinary tract infections simply because of the consistent presence of the clinic and ongoing education for the community. Approximately, 95% of the people that attend clinic are there for primary healthcare and get treatment before it can turn into critical or life threatening situations. The other 5% have been urgent and life threatening situations who are then taken to the hospital in Port au Prince where Dr. Prosper is. Lives have been saved because of Telemedicine.

**Economic Reality**

In poverty stricken populations desperation decides between the visit to a doctor (which involves transportation and medication costs) or buying food. The choice by necessity is buying food. This creates an unhealthy population exposing and endangering an entire community.

**Sustainability is Our Future**

We are planting 'seeds' today for a lifetime of tomorrows. Our team is completely committed to continue investing in the sustainability of healthcare in Haiti. We strongly believe this approach reduces the risks to our survival as a species, well as our planet. Failure to accomplish our goal is not an option. We have no other choice. Lives of thousands of men women and children are at stake. As Mark Twain once said, "Plan for the future, because that is where you're going to spend the rest of your life."

**How is it Sustainable?**

The vision for sustainability for the bigger picture is by utilizing a Social Enterprise Model of Business. We have partnered with Darostar Shipping Company, a small for profit business in Haiti who have committed 20% of profits to support our current Telemedicine initiatives. Darostar will assist us to co-create the same social enterprise model in Boston to increase revenue substantially to ensure our programs are sustained while expanding into different geographical remote areas. Other local initiatives will be developed to help support the local economy, create jobs with profits being invested back into the local health program. Such as an internet café, computer and language school, small supply stores etc.

We have joined a Haiti Medical Network that coordinates health emergencies and care throughout the island but is also instrumental in providing a network of volunteers who are willing to take supplies to Haiti on our behalf to avoid shipping charges. By partnering with companies such as Purdue Pharma, Americares, AFYA and other organizations, we can receive FREE donations that can be sold to other organizations and individuals to make revenue to support our project. Below is an example of how a social enterprise model of business benefits both for-profit and the not-for-profit sectors.
Value Added
The benefit of these rural clinics with the connected internet system is during natural disasters like hurricanes and earthquakes they can also be used as emergency response and communication hubs.

Achievements of Collaborating Partner
LifePaths Global Alliance is the proud recipient of TWO awards from the American Telemedicine Association for our work in Haiti. One for a poster presentation called “Telemedicine, a viable way to deliver healthcare to Haitians” and the other award was for a one-minute video contest called “Expect Telemedicine”. Here is the link to the video. We won $1,000 for this submission.

http://www.youtube.com/watch?v=j3cWqVvK28c

Report from Dr. Joseph Prosper (Medical Director and Project Lead)
In early July 2015, I went to Duchity for the first time to assist and open a new telemedicine clinic in collaboration with Elana Rosenthal from Michigan University. Upon arrival I saw over 100 people lined up and waiting outside the clinic. It is vitally important before starting a telemedicine program in any village that the local people are familiar with the doctor and the health team. This creates a trusting relationship and provides comfort to know that the clinic is operated by qualified health providers.

I realized after attending to the first 20 or so patients that there were many very sick people in desperate need of basic medical attention. I also discovered that over 33% of the people attending, were patients that had to walk from great distance to come see the doctor.

After two months of having clinic once a week in Duchity, I can safely say that I am now a familiar face in the region and when I walk by the people usually come to say hi or wave their hands with gratifying words about the clinic. In a population of over 15,000 people (Duchity and its communes), a clinic such as ours is a much needed element in the community to a point where were asked if the clinic will be open more than once a week and will it expand into other areas to help others who cannot walk great distances.

Although we've only be in existence for ten (10) weeks, it seems as though we've been around for a long time. It is very difficult to fathom what the people use to do before the clinic opened its door. Before the clinic opened there was a lot of our patients had to travel to Au Cailles, a one hour ride on a motorcycle, or would have to stay without food for a few days to be able to have enough money to go see the nearest doctor. As a physician I am proud and happy that I was called upon to take part in such a great project and serving a community such as Duchity, where there's no infrastructure. The creation of multiple connected telemedicine clinics will facilitate the care of the patient from a distance and also collaborate with other physicians around the globe in different specialties to assist the community of Duchity and other rural areas of Haiti.
Most Common Ailments

Diabetes * Hypertension * Urinary Tract Infections * Vaginal Yeast Infections * Pre-Natal Care
Malaria * Rheumatism * Allergies * Skin Disorder * Parasites * Fungal Dermatitis * Diarrhea *
Non-Specified Fever * Malnutrition * Acid Reflux * Anemia * Gastro-intestinal Disease

Community Involvement

A truly sustainable and accepted community project requires a strong level of trust, mutual respect and confidence within the local population. Developing leadership within the community, will create a non-threatening base upon which we can build a growing infrastructure for training staff, and continued support.

To enable and empower the indigenous population to believe in our project, we must believe in them. This involved our team to instill self-confidence in each individual to take responsibility to control their own destiny. Changes within their social construct involves patience, being non-judgmental, and uncritical acceptance of local customs, religious beliefs, and cultural norms. An organized health education program can be integrated with a modular multimedia (audiovisual) format such as ‘homegrown’ video’s using local people to communicate the skills necessary to identify problems and solutions. Village meetings on specific times and days can be organized by the project coordinator, to establish consistent and sustainable programs.

The Team

Our team is confident that implementing this project will have a tremendous humanitarian and environmental impact on the lives of thousands of Haitians. The knowledge and care imparted to these men, women and children will generate a paradigm shift from a life of desperation to a self-perpetuating, sustainable quality of existence.

Our Guiding Principles

✓ Collaboration: Working with the community to deliver coordinated and efficient services
✓ Patient focus: The needs and care of the patients are the main priority
✓ Compassion: The patients, families, and team members will be treated with kindness
✓ Quality: We will strive for excellence and high quality through creativity and innovation
✓ Integrity: We will adhere to high ethical standards to be transparent, equitable and trustworthy
✓ Teamwork: We will strive for a teamwork environment that is conducive to a healthy workplace
✓ Knowledge: We will ensure that knowledge transfer and wisdom are shared for the benefit of all
✓ Accessibility: We will endeavour to make healthcare accessible to all regardless of where they live
✓ Inclusivity: All people will be entitled to receive healthcare
✓ Mindset: We are aware of our fiscal, social and environmental responsibility

The University of Michigan - Student Team

Elana Rosenthal – Team Lead and Project Manager, Michigan School of Literature, Science and the Arts
Matthew Chapman – Team member, Michigan School of Medicine
Asher Feigenbaum – Team member, Michigan School of Engineering
Professor Andrew Jones - Faculty Advisor, Michigan School of Public Health

On the Ground in Haiti - The Medical Team
Dr. Joey Prosper – Medical Director and Project Lead. Dr. Prosper is a Haitian and is a resident of Haiti. He owns a clinic in Port au Prince and in addition has provided free mobile healthcare for over 10 years in the rural Haiti. Dr. Prosper is prepared to dedicate up to 75% of his time, since it is now a better use of his time to our Telemmedicine initiatives in Haiti. His travel time has been reduced to zero as he can remain in his hospital in PAP while assessing people in rural Haiti via Telemmedicine. Dr. Joey is truly a doctor who has invested in his people’s healthcare. In addition, Dr. Joey will be responsible for:

- Lead the LGA Telemedicine Clinic with absolute integrity
- Record documentation as follows:
  - Expenditures – recorded as per clinic
  - Funding distributions – as per project outline with expense report
  - Medication dispensing – documented and recorded as per patient as well as inventory control

Erole Lafleur  Telemedicine Assistant # 1. A Nursing student who also coordinates staffing
Privy Soufranc  Telemedicine Assistant # 2 and Registered Nurse in Duchity
Natasha Lafontan  Telemedicine Assistant # 3 and Registered Nurse in Duchity

**Telemmedicine Collaborator on the ground in Haiti**

Elaine Knight, Founder of LifePaths Global Alliance (LGA), a Canadian Charity that created the Telemedicine Assistant Course and developed the first Primary Care Telemedicine Clinic in Haiti after the earthquake in 2010. Elaine has experience in community relations, development strategies, and case management, ethical and professional issues.

*Other Collaborators*
Meg Polyte, Volunteers for Peace
Purdue Pharmaceutical
Americares
Science with a Mission

**Background of Haiti – Health and Poverty**

Haiti is considered the poorest country in the western hemisphere and the 3rd hungriest in the world. Haiti occupies the western smaller portion of the Island Hispaniola, shared with the Dominican Republic and gained independence as part of a successful slave revolution in 1804. Haiti had their first freely elected leader in 1990. It has some of the worst health indices in the world, according to the World Health Organization. [http://www.who.int/en/](http://www.who.int/en/)

On January 12, 2010 a 7.0 earthquake devastated Port au Prince killing up to 250,000 people and displacing over 1.5 million into tent cities putting them at risk for storms, flooding and disease. The earthquake amplified these terrible conditions with many hospitals destroyed, medical personnel and students killed, and the Government Buildings, including the Ministry of Health collapsing and devastated beyond repair.

On October 19, 2010, ten months after the catastrophic earthquake, that killed over 200,000 people and displaced over 1.5 million, the Haitian Ministry of Public Health and Population (MSPP) was notified of a sudden increase in patients presenting with watery diarrhea and dehydration in the *Artibonite* and *Centre* Departments.
On October 21, 2010, the Haiti National Public Health Laboratory identified the pathogen as Vibrio Cholerae. One day later, the first cholera outbreak in Haiti in at least a century was officially announced. To date, over 470,000 cases of cholera have been reported in Haiti with 6,631 attributable deaths. [http://www.cdc.gov/haiticholera](http://www.cdc.gov/haiticholera)

**Non-Communicable Diseases**

Non-Communicable Diseases are a global public health crisis of epidemic proportions claiming over 36 million lives with an economic cost of seven trillion dollars. NCD’s include: high blood pressure; diabetes; obesity; respiratory and cardiovascular disease (CVD); and cancer. Early intervention can potentially save millions of lives and drastically reduce the economic cost of treatment and lost productivity. Thousands of people are unaware that life threatening diseases can be asymptomatic until detected to a point of loss of life.

Haiti’s population is 80% below the poverty line, less than half having clean drinking water, according to the World Health Organization (WHO). Twenty percent of children, ages 5-14 are victims of child labor, and an illiteracy rate of over 50%. There are currently 25 physicians, 11 nurses, and 130 hospital beds per 100,000 people.

Statistical analysis through surveys, polls, and other epidemiological data is almost non-existent in rural Haiti. Approximately 5 million Haitians (half the population of Haiti) are rural dwellers. They are at high risk of food or waterborne diseases: bacterial and protozoal diarrhea, hepatitis A and B, and typhoid fever.

**Why Create The Haiti College of Telemedicine?**

Telemedicine is the answer and the solution is the development of the Haiti College of Telemedicine, an educational program based on the MediCruiser College of Telemedicine in Salt Lake City, Utah, United States by Dr. Paul Gahlinger, a pioneer in Telemedicine. This requires a program uniquely developed for the needs of Haiti—designed, operated and owned by Haitians. An integral part of this program is training. There is currently no suitable training that addresses the skill sets needed for telemedicine nurses or community health workers. The Haiti College of Telemedicine is a plan to provide such training. A two (2) week intensive training course for community health workers, equivalent to Certified Nurse Assistant in the U.S.

<p>| Day 1 | Meeting all personnel. Intro to concept and operations. Overview of healthcare in Haiti. History, current challenges, plans for future. Interactions with patients x Privacy x Confidentiality x Abusive or manipulative and demanding patients x Role playing. Intro to physical exam: x Constitutional assessment x Mental health x Vital signs. Height, Weight, Blood Pressure, Heart rate, Temperature, Pulse, Oxygen x Practice |
| Day 2 | Public health hygiene. Pediatric routine examinations x Newborn x Infant scheduled assessment, well baby examination x Early child x Growth curves and development x Role playing |
| Day 3 | Examination of head, eyes, ears, nose, throat, mouth, dental. Scalp and face examination, External and internal ears Digital audiometry (500-4000 Hz) Visual acuity check. Eye exam: conjunctiva, pupils' Nasal examination Oral, pharyngeal, and dental examination Neck and thyroid examination. Practice of telemedicine of above. |
| Day 4 | Examination of upper and lower extremity x Skin examination, including axilla and nails. Arm, wrist, and finger sensation (monofilament and vibration) Arm, wrist, and finger motor exam, Pulses, Reflexes, Capillary refill, Tinel’s and Phalen’s tests. Feet and nails, ulcerations, dryness and pressure spots. Leg, ankle, and toe (monofilament and vibration) Leg, ankle, and toe motor exam. Splints and wrapping. Crutches, fitting and instruction of Physical therapy Practice of telemedicine of above. |
| Day 5 | Examination of heart and lung. Heart sounds with digital stethoscope. Chest sounds, respiratory rate and action (arrange pulmonary function testing, if indicated) Blood pressure Pulse oximetry Lung function (spirometry) |
| Day 6 | Neurological and psychological examination. Complete cranial nerve neurological test (CN I-XII) Proprioception and balancing. Mental status examination. Depression and anxiety |</p>
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Dr. Joey Training the Telemedicine Staff
Telemedicine Project – Accessing Primary Health Care and Health Education in Rural Haiti

- **Teaching Facility (Hospital)**
  - **Staff:** $20,000 for one year
  - **Equipment, Sanitation, and Training materials:** $6,000
  - **Furnishings:** $3,000

- **CREATE 4 ADDITIONAL CLINICS**
  - **Staff:** $4,000 per year
  - **Medical Staff:** $1,000
  - **Medication:** $8,000 (will get something)
  - **Misc:** $4,000

- **CREATE SOCIAL ENTERPRISE SHIPPING BUSINESS**
  - **Office Rent, Staff, Business License, Insurance:** $1,000

This money will be returned when the company makes profit. Then a 20% revenue will flow to sustain and expand programs.