

PARTNERSHIP FOR GLOBAL HEALTH TECHNOLOGIES



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OUR VISION

The Partnership for Global Health Technologies (PGHT) aims to improve health care via a multidisciplinary approach towards engineering solutions. Under the mentorship of Professor Muhammad Zaman and Dr. Ishrat Bano, and in partnership with the State University of Zanzibar (SUZA), a team of Boston University students from various backgrounds will work toward improving delivery of maternal healthcare in Zanzibar by applying biomedical engineering principles within a public health context. Through collaboration with medical students at SUZA, PGHT will work to design an affordable and robust diagnostic to address pre-eclamptic renal and liver failure, while keeping sociocultural factors and local limitations in consideration.

MODELLING PUBLIC HEALTH CHALLENGES

Understanding the socio-ecological drivers of a public health problem in the context of the country (socially, politically, economically) is imperative when designing an intervention. The public health and mathematical modeling groups take two approaches in supporting the goal of improving access to quality maternal health care in Zanzibar. The public health group provides country specific knowledge to support the design group in ensuring that our device can be effectively adopted and utilized in Zanzibar. The group is designing a survey that will be administered to health professionals in East Africa to help us understand how to make our device accessible in Zanzibar. The survey will collect information on the affordability, accessibility, and adoptability of the technology. The mathematical modeling group is designing a causal loop model that serves as tool for optimizing the supply chain of maternal health commodities particularly medicines and technology. The model will include a series of variables and functions of factors in the supply chain to map out how medical technology reaches the patient. We aim to improve the overall efficiency and efficacy of the supply chain resulting in wider access to life-saving technology.

FIELD WORK IN ZANZIBAR

Summer 2015 marked the inaugural trip to Zanzibar for PGHT. Three students from Boston University's College of Engineering collaborated with medical students at SUZA to conduct a baseline needs assessment in the area of maternal care. The team visited local hospitals and health centers across Unguja, Zanzibar's biggest island, ranging from rural clinics to Mnazi Mmoja Hospital, the only tertiary care facility in Zanzibar. Interviews were conducted with over 100 local mothers as well as a variety of health workers including doctors, nurses, midwives, traditional birth attendants, and even a local witch doctor to understand the complications faced by pregnant mothers as well as how these challenges were being addressed. The group also met with the Ministry of Health and the World Health Organization (WHO) in Zanzibar to discuss issues such as regulatory guidelines for medical devices and diagnostics in the area. Pre-eclampsia was identified as a major issue in pregnant women in Zanzibar and management of the disease was identified as an area for technological improvement.



LAB RESEARCH

The lab component of PGHT research aims to create a useful diagnostic device for testing organ function in pre-eclamptic women, and consists of researching and testing specific biomarkers with existing technologies. To gain an understanding of cheap and simple biomarker detection methods, initial lab work focused on measuring creatinine and albumin levels, as well as pH, with urine testing strips that are currently available in Zanzibar (Siemens Multistix 10 SG). Synthetic urine was prepared with various concentrations of the biomarkers and tested the accuracy of the strips. With further research, the lab groups have also focused on other biomarkers for liver dysfunction, in order to monitor the severity of pre-eclampsia. These biomarkers, alanine aminotransferase (ALT) and aspartate aminotransferase (AST), are liver enzymes that deviate from normal levels when liver function is impaired. Currently, lab members are researching the biochemical pathways of ALT and AST, different assays to detect ALT/ and AST, and possible drug interactions that may affect ALT and AST levels in pregnant women.



MEET THE STUDENTS

Devika Nadkarni
B.A. Chemistry, 2017

Jared Lawson
B.S. Mechanical
Engineering, 2018

Maya Saint Germain
B.S. Computer
Engineering, 2016

Grace Kim
B.A. Neuroscience, 2017

Harshit Harpaldas
B.S. Biomedical
Engineering, 2018

Hoda Yehia
B.A. Biology 2017

Napassorn
Lerdsudwichai
B.S. Biomedical
Engineering, 2018

Samuel Sharon
B.S. Biomedical
Engineering, 2019

Sandesh Gourkar
M.S. Biomedical
Engineering, 2017

Sara Gravelyn
M.S. Biomedical
Engineering, 2017

Sarem Rashid
B.S. Biomedical
Engineering, 2018

Adedayo
Jobi-Odeneye
MPH, 2017



“I knew I wanted to do meaningful work to help others after graduation but I didn’t know if I would be able to see the direct impact of my work as a computer or software engineer. This program provided me with a way to use my technical and analytical skills to the benefit of others. Applying for and being accepted into the Partnership for Global Health Technologies Program renewed my interest and sense of purpose in my academics.”

Maya Saint Germain
B.S Computer Engineering

“I am very interested in working with point-of-care diagnostics in resource poor areas so the Partnership for Global Health Technologies program is the perfect opportunity for me to obtain real world experience in my area of interest. We are working through every part of the device development process from the initial field assessment to device conceptualization and creation and eventually to device testing and implementation.”

Sara Gravelyn
M.S. Biomedical Engineering

“A lesson we learned in Zanzibar regarding technology development was how many of the healthcare problems are interrelated. For example, there may be technology gaps in rural settings so doctors have to refer patients to the main hospital in Stonetown, which then presents the issue of transporting the patients to Stonetown. Once the patients get to Stonetown, the hospital may be overcrowded or understaffed. These problems are complex and we have to keep that into consideration when developing our device.”

Jared Lawson
B.S. Mechanical Engineering



MESSAGE FROM THE DIRECTOR

I am delighted to share our first quarterly newsletter with you. This newsletter, and our activities, are truly a student effort and I am honored to be a part of the excitement that we call the global health technologies program at Boston University.

With the help of support from HHMI, we are aiming to build new bridges of science, cultivate cultural understanding and develop an educational program that focuses on using multi-disciplinary tools to address high impact global challenges of our time. Our mission is simple: To engage students in high-end research that is focused both on rigorous science and impact on the society at large. Our students, who represent a diverse array of disciplines and backgrounds, are committed to making a global impact, through their work both inside and outside the laboratory. Over the last year, we have fostered new partnerships, engaged students across multiple continents and have developed a foot print in Africa that brings together peer-to-peer learning, hands-on training and multi-disciplinary research.

We have embarked on a wonderful journey and I hope that as we develop technologies, create new knowledge and engage stakeholders from various sections of the society, we will benefit from the vision, experience and expertise of people all over the world. I sincerely hope that you will join us and be a part of our effort to make the world a better place through education, science, engineering and global engagement.

Yours,
Muhammad H. Zaman
Howard Hughes Medical Institute Professor

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BY



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