Partnership for Global Health Technologies

December 2016, Issue 4

OUR VISION

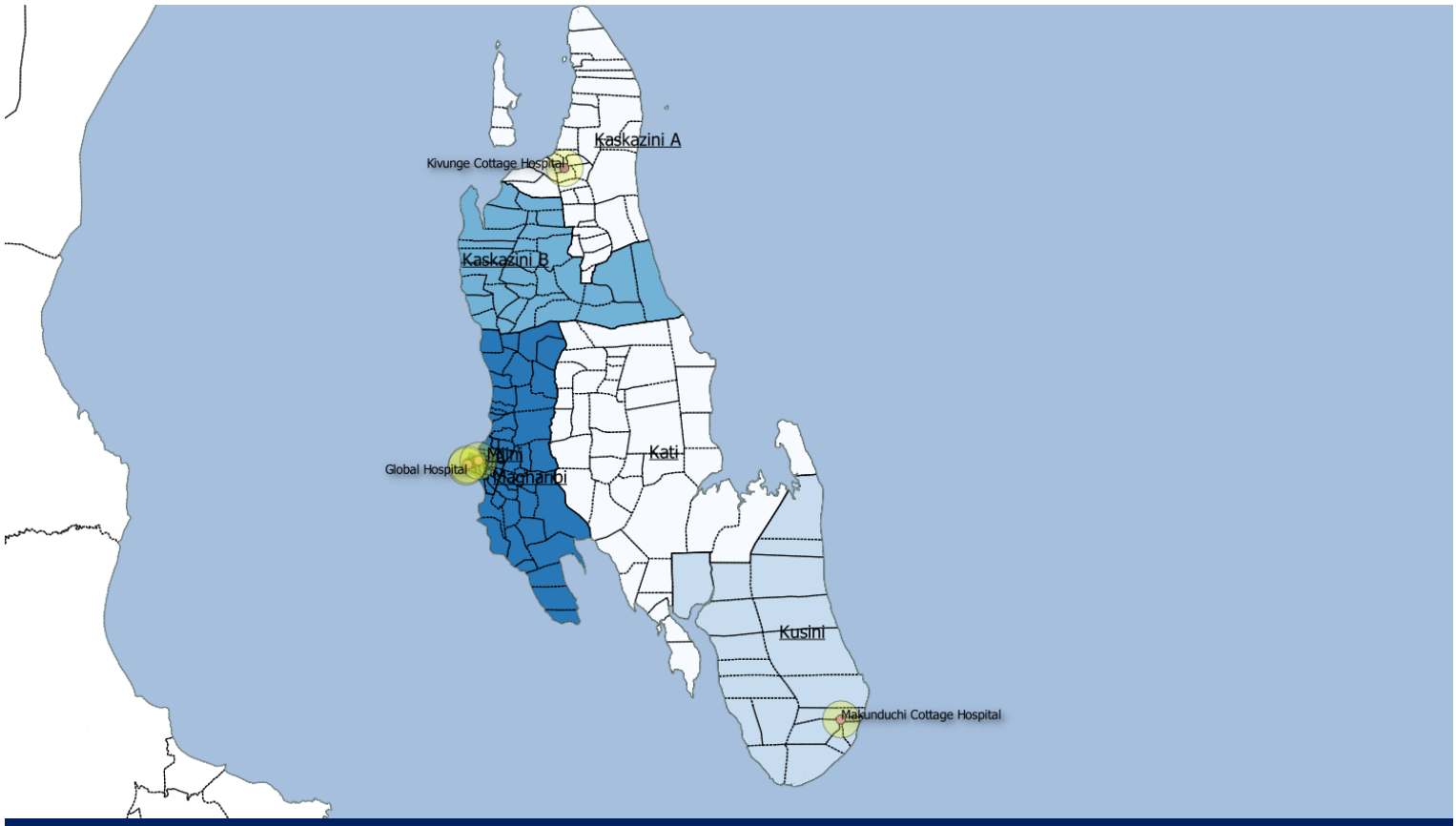
The Partnership for Global Health Technologies (PGHT) is a collaboration between medical students from the State University of Zanzibar (SUZA) and Boston University students. PGHT aims to improve the quality of health care in Zanzibar by applying biomedical engineering principles within a public health context. We use an interdisciplinary approach to address the most pressing issues in healthcare delivery in Zanzibar.

The lab team is currently working to design an affordable and robust diagnostic to address preeclamptic liver failure. This semester, they focused on testing and validating their assay in the lab.

The mathematical modeling team uses dynamic health system modeling to model patients' access to quality health commodities, identify bottlenecks and inequities that hinder the system's responsiveness, and build capacity of health delivery. This semester, they developed a quantitative framework to track dose shipments of oxytocin to Zanzibar and a qualitative framework to model women's ability to access oxytocin.

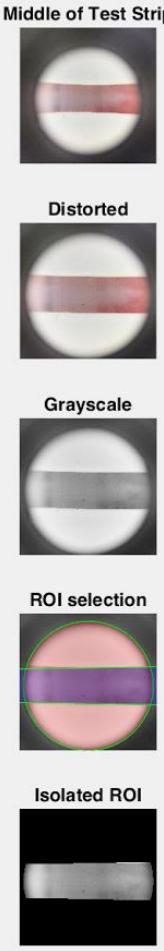
The public health team examines socio-ecological drivers of public health challenges to ensure adoptability and utilization of proposed technology and anticipate potential obstacles .

The quality control team is examining image processing techniques to distinguish between quality and defective malaria rapid diagnostic tests (RDTs) . This semester, they began using Python to develop techniques for image recognition.



Modeling Public Health Challenges

This fall, the modeling group made substantial progress in their dynamic health system model for maternal health in Zanzibar. The team worked to find data on oxytocin supply in Zanzibar and maternal access to birthing health facilities. The team has produced a working model of the cold supply chain of Oxytocin, a drug used for postpartum hemorrhage (PPH). The goals of this project were to understand the availability and access of quality Oxytocin within Zanzibar as well as the factors affecting maternal health service utilization. Therefore, the model explores two components – the effectiveness of the drug supply chain and the likelihood of pregnant women birthing in a health facility. The access component utilizes geographic information systems (GIS) to estimate the population in need of oxytocin while the supply chain component produces estimates of the supply of quality oxytocin at any given time period. This model will highlight the bottlenecks and inefficiencies in the system and help policymakers' interventions.



Quality Control of Malaria Rapid Diagnostic Tests

The Quality Control group has obtained images of 107 malaria rapid diagnostic tests (RDTs), before and after use, over the past summer. With a total of 1,284 images, the QC group is currently working to automate the process of region-of-interest detection for every image. After identifying all regions-of-interest, quantitative analysis of each image will be done to provide descriptive statistics of each image type, and a classification scheme applied to the distribution of each statistic obtained. These trends will then be analyzed to guide the development of a successive and more robust data collection effort. This successive effort will be used to validate initial results and refine the methodologies used differentiate between individual malaria RDTs and ultimately RDTs with valid vs. invalid results.

Maternal Health & Liver Function Monitoring

In developing the amperometric assay, which is designed to quantify the concentration of ALT— a biomarker for liver function — by measuring the current generated from the ALT-coupled-enzyme assay, the lab team has been able to show evidence of the assay's potential in generating a current through the detection of linearly decaying absorbance values of NADH, which is steadily consumed by the coupled enzyme— lactate dehydrogenase. In order to validate whether the ALT concentrations calculated from the assay are accurate, the team has also been determining a control method for obtain standard ALT concentrations to which they can compare the experimental ALT readings from their assay.

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Student Voices

" Its been a great opportunity for us at the State University of Zanzibar (SUZA) to participate in global health technology in collaboration with Boston University team toward on designing a liver function test device particularly focusing on ALAT as a rapid diagnostic test for liver failure as a complication of pre-eclampsia and eclampsia. We hope our collaboration between medical team from SUZA and biomedical engineering from Boston together will bring a great change in maternal health particularly in low developing countries like Zanzibar"

Sumayya S. Musa, State University of Zanzibar

Message from the Director

Dear Colleagues and Friends,

The PGHT program continues to grow and develop new partnerships both within our institution, the US and elsewhere. During the last quarter, we welcomed Dr. Darash Desai as a technical lead on the project, as well as in-lab training of students. We also continued our projects on analysis of rapid diagnostics, development of tests for eclampsia and pre-eclampsia and systems level modeling on access to quality care. I encourage you to take a look at them and share your thoughts with us. We would love to hear from you.

In this issue, you will also see that we feature the voice of one of our Zanzibari students. In the coming issues, we will continue to bring their voices and experiences to you, just as we will share the perspectives of our students.

Together, through partnership built on scientific rigor, cultural respect and mutual understanding, we hope that we will be able to bring new ideas and innovative approaches to complex health problems. We look forward to your continued support in our collective pursuits for a better world.

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Howard Hughes Medical Institute Professor

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