

Global mHealth Initiative

2013 Annual Report



Collaboration

Innovation

Excellence



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UNIVERSITY

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Alain B. Labrique, MS, MHS, PhD
Director

On behalf of the Steering and Executive Committees of the JHU Global mHealth Initiative, it gives me great pleasure to share with you the first Annual Report 2012-2013. Comprising membership from each Division of the Johns Hopkins University, Jhpiego, Applied Physics Lab, and major Centers across the Schools of Public Health, Engineering, Business, Nursing and Medicine, the JHU Global mHealth Initiative has attracted significant national and global attention in the short time since its inception in 2011.

With over 80 registered projects in the emergent field of mobile health (the science of research and innovation leveraging information and communications technologies for improved clinical and population health outcomes), Johns Hopkins University has rapidly gained a reputation of excellence and leadership in this space. We have seen a global ‘revolution’ in the spread and sophistication of mobile technologies over the past decade, opening new windows of opportunity to engage patients, support providers, and strengthen health systems. JHU researchers have been on the forefront of this innovation space, testing new and exciting ideas in settings from Baltimore to Bangladesh and Botswana. Research members of the JHU Global mHealth Initiative have provided seminal contributions to the evidence base around mHealth, students are being trained in the design, implementation and evaluation of mHealth projects, and interdisciplinary collaborations across our Institution have been forged to develop solutions aimed at streamlining research through digital data collection, while other innovations have focused on making health care more effective, efficient and accountable.

It has been a great privilege to serve the JHU community and help to grow this emergent ecosystem that exemplifies our vision of “One Hopkins”, unified in a mission to improve health for populations across the globe through the application of appropriate, transformative technologies.

Sincerely,



Alain Labrique

Dr. Alain B. Labrique, Director
Dr. Elizabeth Jordan, Associate Director

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Abstract

The JHU Global mHealth Initiative (JHU GmI) is a University-wide Community of Excellence, connecting faculty and students in interdisciplinary collaborations in the field of mobile health, spanning development of and research in mobile technologies for patient and population health. The mission of JHU GmI is to develop responsive innovations and provide rigorous, evidence-based support for mobile information and communication technologies (ICTs) to improve global health, focusing on resource-limited settings where the burden of disease and mortality are highest. Our focus is on technology that is appropriate and scalable. JHU GmI facilitates and focuses resources within the Johns Hopkins University, and serves global public and private sector partners (such as WHO, GSMA, mHealth Alliance, USAID, etc.) in identifying appropriate mHealth strategies for global health challenges and providing expertise in technology development, health information content, efficacy research and program evaluation.

Globally, mHealth has been identified as a key pillar of future health systems innovation. However, governments and implementing agencies are struggling to identify evidence-based, appropriate recommendations and interventions. JHU GmI's academic leadership addresses an urgent need in the area of public health policy and guidance, with faculty now engaged at the highest levels of this global discourse. The exponential growth of JHU GmI's visibility and leadership in mHealth has garnered attention from public and private sector partners, donors, policymakers, prospective students and the press. Continued support for this Initiative will enable the Johns Hopkins University to maintain its influence and leadership, with impact on health and well-being of populations across the region, nation and globe.

Executive Summary

Since its inception in late 2010, the JHU GmI has rapidly emerged as a recognized academic leader on the forefront of mHealth research, innovation and policy. Currently directed by faculty members in the Schools of Nursing and Public Health, the JHU GmI is guided by a 30-member steering committee comprised of experts spanning each major division of the Johns Hopkins University system.

The JHU GmI has been extremely successful in bringing attention to the broad array of innovation and research within the mHealth domain across the JHU ecosystem, attracting private and government funding for faculty and students working with wireless and mobile technologies as well as for the Initiative itself.

JHU GmI faculty and students continue to be recognized for their contributions in advancing this emerging field of research, and GmI representation is sought at the highest levels of mHealth policy and program activity internationally and in the US. The richness of the JHU GmI network is recognized as unique in the field of mHealth, and serves as a model for interdisciplinary collaboration.

From Baltimore to Botswana, JHU GmI Faculty are engaged in developing and testing new strategies to improve health, quality of care and reduce the burden of disease and mortality using mobile and wireless technologies. In addition, JHU GmI faculty teach a number of courses on mHealth and are actively developing professional and academic certificate programs to confer specific competencies required for professional practice or research in the mHealth field.

Over 150 students from the Schools of Medicine, Public Health, Nursing, Business and Engineering/Computer Science contribute to the scientific activities of the Initiative; to date 110 scholarships have been awarded by JHU GmI to allow Hopkins students to participate in the key global mHealth conferences. Beyond that, 14 students have benefited from internship opportunities in mHealth, several paving the way to leadership positions in mHealth implementing agencies (USAID, WHO, UN Foundation, Columbia University).

Major Accomplishments

Research

- Award of NIH, WHO, Gates Foundation, UBS Optimus Foundation, and McKesson Foundation grants to GmI Researchers (> \$3 mil in total Sponsored Research Grants to SPH alone)
- Recognition of GmI Research Projects as Lead Innovations (Top 11 in 2011 Rockefeller Foundation)
- Advisory support provided to faculty and students submitting grants in mHealth
- \$25,000 grant to support interdisciplinary student research secured from McKesson Foundation
- \$62,000 planning grant to develop mHealth projects to support Private Sector Fortune 500 company.
- \$250,000 grant awarded to GmI Partners to advance mHealth innovations in maternal and newborn health
- Key publications of mHealth evaluations in resource-limited settings, mHealth taxonomy, and quality of information criteria score.

Education

- Two new courses on mHealth implementation and evaluation at East Baltimore Campus (Attendance > 100 students, to date)
- Increasing numbers of students across Schools integrating mHealth strategies into their Masters or Doctoral work.
- Mentoring interdisciplinary student teams developing mHealth solutions for testing.
- Executive Track mHealth Certificate Program under development
- mHealth guest lectures incorporated into curriculum of Community Trials, Teaching with Technology, Data Management, Humanitarian Emergencies, Current Issues in P.H.
- Active Social Media promotion (Twitter, FB, Website) of JHU research and innovation in mHealth

Scholarship

- Monthly Seminar Series draws Global mHealth research leaders to JHU (15 held to date)
- Monthly Student-led Journal Clubs introduce key issues in mHealth research
- Entrepreneur Fair held at Whiting School of Engineering / Dept. of Computer Science
- 12 Student Internships completed or in progress in overseas mHealth activities, with long-term appointments to WHO, UN Foundation, Columbia U.
- >100 member student mHealth Community formed and supported (SIMRI)

Policy

- Led formation of World Health Organization mHealth Technical Advisory Group (TAG), chaired by GmI Director with membership of several steering committee faculty
- JHU GmI Representation on USAID Child Survival Advisory Group
- Global Policy Working Groups: mHealth Evidence Working Group, mPowering Frontline Health Workers, Bellagio eHealth Evaluation Group

Internal Development

- Over 80 projects registered in JHU GmI Repository, 28 project-specific highlights created
- Collaborative relationships with other JHU Centers: Center for Global Health, Center for Clinical and Global Health Education, Center for American Indian Health, Center for Injury Prevention, Center for Population Health IT, Center for AIDS Research

External Development

- Collaborations with Industry Partners negotiated (NDAs with Qualcomm, Avery Denison), and under process: Verizon, GSK, HIMSS
- JHU GmI to co-host the Wireless Health Summit (WLSA)
- JHU Projects listed in WHO mHealth Activity Survey
- Collaborations actively developed between JHU Faculty and NIH Researchers (eg. mDermatology)

Leadership

- 3 Student Innovation Teams mentored and supported to spin-off companies
- Advisors to the UN Secretary General's Innovation Working Group mHealth Catalyst Projects and to PMNCH
- JHU GmI Faculty mHealth Keynote talks at (sample of total): UN Rio+20 Summit, mHealth Summit 2011/2012, International Cancer Congress 2012, Obesity Society 2012, Preventive Medicine 2013, JHU Leadership Conference, Gates Foundation Saving Lives at Birth 2012, GetHealth Summit 2013, Technology Transfer Summit 2012, Unite for Sight 2012/2013, World Health Summit 2012

A person wearing a white lab coat is standing in a rural, dry landscape. They are holding a clipboard in their left hand and a mobile device in their right hand. The background shows a dirt path, some sparse vegetation, and a thatched roof structure on the right.

Mission

The mission of the Johns Hopkins University Global mHealth Initiative (JHU-GmI) is to develop responsive innovations and provide rigorous, evidence-based support for mobile ICTs to improve global health with a focus on resource-limited settings where the global burden of disease and mortality are highest.

Vision

To capitalize on engineering, information technology (IT) and population-based research strengths; to develop and test novel solutions; and to integrate active research into teaching and learning opportunities for students, this Initiative facilitates and expands upon the collaborative networks of researchers, educators, and practitioners involved in mHealth across the Johns Hopkins University. The Initiative supports the application of state-of-the-art science and technology, and provides dynamic leadership to global mHealth research, programs and policies. The GmI stimulates mHealth leadership internally within the JHU community and in the broader public health community.

Website

The JHU GmI website (www.jhumhealth.org) is a major resource for faculty, students, and anyone interested in mHealth. Our site helps keep people informed of the latest trends in mHealth, upcoming events and conferences, and allows people to view projects from around the University. It's also home to a myriad of other resources such as job opportunities, publications, videos, webinars and mHealth lectures by Hopkins faculty.

Resources



GMI Information



Education Opportunities



Groups & Organizations



mHealth Videos



Papers



Job Opportunities



Mobile Apps & Tools



Reports



Conferences



Grants and Funding



Webinars



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Global mHealth Initiative
A Community of Excellence in mHealth Research, Innovation and Leadership

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Global mHealth Initiative Survey

The list of mHealth projects at Johns Hopkins is growing rapidly. Click here to view the results, and [add your own project!](#)

[Read More](#)

The JHU Global mHealth Initiative is a University-wide Community of Excellence, connecting faculty and students in **interdisciplinary collaborations** in the field of mobile health.

Our work spans **development** of and **research** in **mobile technologies** for patient and population health.

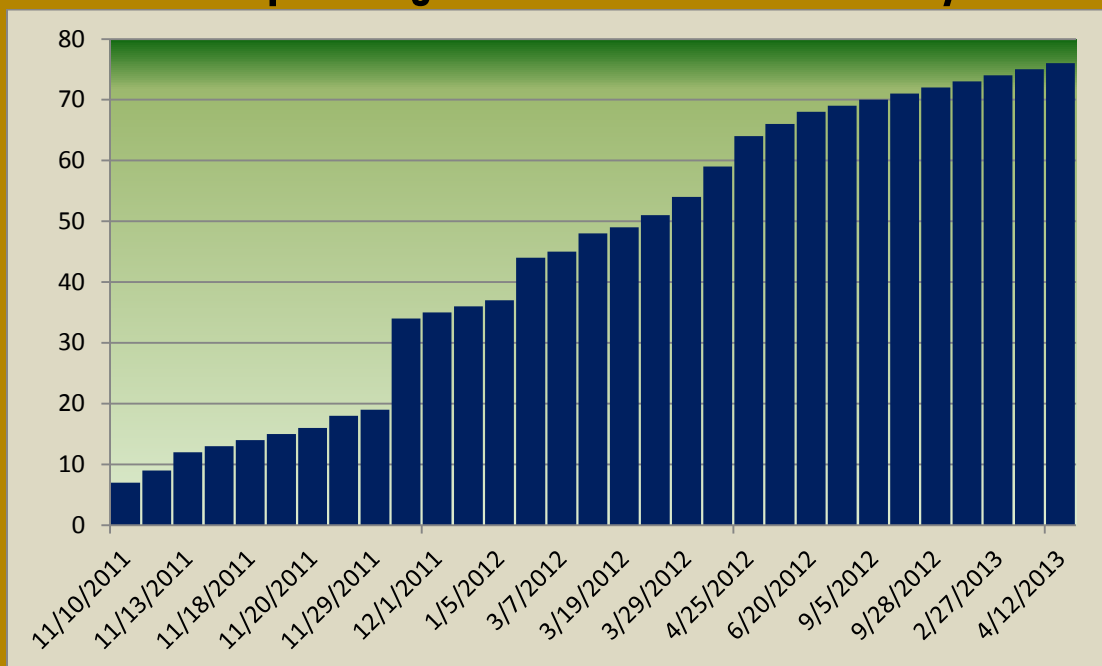
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Projects



Projects range from innovations that improve the delivery of efficacious, life-saving interventions in remote, rural populations to tools that aim to help providers access timely clinical information, assess and engage patients and reduce health care costs. Since its launch in late 2010, GmI's project registry has grown from a dozen projects to over 75, many reflecting interdisciplinary collaborations across the JHU ecosystem. A summary of these projects is captured in the University-wide survey hosted on the JHU GmI Website (<http://www.jhumhealth.org/content/registered-projects> or scan the QR code on the top right of this page). You can see a sampling of GmI Projects on the next five pages.

GmI Projects Registered Across the JHU Ecosystem



This chart shows the growth of registered projects over the last two years.



mHealth Domain: Maternal and newborn health education

Title: “Text4Baby”

PI: Dr. Elizabeth Jordan

Affiliation: JHU School of Nursing

Dates: Ongoing

Project Summary

To help more pregnant women and new moms get information about caring for their health and giving their babies the best possible start in life, the National Healthy Mothers, Healthy Babies Coalition (HMHB) launched text4baby, the first free health text messaging service in the U.S. Text4baby supports moms by providing accurate, text-length health information and resources in a format that is personal and timely, using a channel she knows and uses. Over 85% of Americans own a cell phone and 72% of cell users send or receive text messages.

The program, made possible through a broad, public-private partnership, is the first free mobile health information service in the United States and is an important example of leveraging widely used technology—in this case, cell phones—in new ways to improve the lives of Americans. Pregnant and new moms who sign up for text4baby (by texting BABY or BEBE to 511411) receive three text messages per week containing health tips and resources.

Geographic Scope

United States

Focus

Benefits pregnant women and newborns and reaches resource limited settings

Goals

- Demonstrate the potential of mobile health technology to address a critical national health priority: maternal and child health.
- Demonstrate the potential of mobile health technology to reach underserved populations with critical health information.
- Develop a base of evidence on the efficacy of mobile health interventions.
- Catalyze new models for public-private partnerships in the area of mobile health.

Strengths

Much can be learned about the implementation of text4baby from multiple perspectives: real-time data, partners, providers, and users. The data can shed light on trends at the national level in designing and implementing the program as well as how communities engage in the text4baby program in a local context. Understanding the data will add significantly to the evidence base that will bolster the development of mHealth and related initiatives in other public health interventions, such as healthy behavior applications focused on weight management, nutrition, and smoking cessation and disease management applications.

Limitations

Less than 2 years since launch, national evaluations are ongoing

Contact

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mHealth Domain: Technology

Title: eMOCHA

PI: Larry Chang, MD MPH

Affiliation: Johns Hopkins School of Medicine

Project Summary

eMOCHA (electronic Mobile Open-source Comprehensive Health Application) is a secure, highly flexible and adaptable, open-source mHealth software platform developed by the Johns Hopkins Center for Clinical Global Health Education. eMOCHA is designed to leverage mobile devices to assist health programs, researchers, educators, providers, and patients improve communication, education, health care, and data collection. eMOCHA synergizes the power of mobile technology, Android-supported devices, video and audio files, and a server-based application to analyze and GPS-map large amounts of data, implement interactive multimedia training, and streamline data collection and analyses.

Geographic focus

eMOCHA projects have been deployed or are under active development in Uganda, Afghanistan, Columbia, Panama, El Salvador, India, and the US.

Focus

Use mobile device based data collection and smart forms in order to optimize community and home based strategies in the areas of HIV counseling and testing, HIV treatment adherence, TB diagnosis and treatment, malaria prevention and treatment, maternal and child health, reduction of IV drug use, management of chronic diseases, Dengue surveillance, oral cancer screening, and prevention of domestic violence.

Key Facts

- Runs on all Android devices
- Real-time or near real-time syncing with server via WiFi or cellular network
- Uses mobile phones or tablets as the main source of data, but data can also be entered (and viewed) directly through the web-based interface and through Toll Free SMS, a feature allowing data collection from regular cell phones (dumb phones). SMS can also be sent to phones.

Strengths

- Flexibility: Use of XML forms allows multiple data collection formats including multiple choice answers, text entry, pictures, bar codes, audio, and video
- Efficiency: Incorporates logic/branching within and between forms (skip patterns, parameter checks)
- Security: Server incorporates 256 bits AES encryption. Data transferred from the phones uses 128 bits SSL encryption. Phone data storage can be encrypted as well or pushed into an internal database.

Limitations

- Acceptability to use such technology within communities

Contact

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Title: Tailored Rapid Interactive Mobile Messaging (TRIMM) for Weight Control among the Underserved

mHealth Domain: Research / SMS for Weight Control

Investigators: Lawrence Cheskin MD, Michael K. Lin

Affiliation: Johns Hopkins Bloomberg School of Public Health

Dates: 2011-2013



Project Summary

A challenge to achieving and sustaining lifestyle changes among obese, marginalized adults is the cost and intrusiveness of traditional interventions. Mobile technology provides an opportunity to remotely deliver behavioral obesity interventions that are cost effective and widely accessible.

We have developed Tailored Rapid Interactive Mobile Messaging (TRIMM), an automated text message program for weight loss. Our purpose was to develop a cost-effective, proven, and scalable obesity intervention that can be deployed as a sustainable treatment option for obesity. We've begun by conducting a 12-month randomized clinical trial of the TRIMM program supplementing standard care, compared with standard care, among underserved adults in Baltimore seeking weight loss.

We designed TRIMM as an automated, 6-month text message program that tailored itself in two main ways to offer individualized interaction and content for weight control. First, we targeted relevant behaviors at the opportune times by personalizing the program to each individual's weight control challenges and daily routine. Second, we engaged participants with daily interactive messages that asked participants a question regarding their weight, motivation level, or health behavior. Upon receiving a participant's response, we delivered finely-tailored feedback automatically, promoting accountability and self-monitoring. TRIMM also tailored itself to each participant's progress in weight loss.

Geographic Scope

Baltimore, Maryland

Focus

Obesity and weight control; behavior change; SMS-based intervention

Project Results and Future

We have captured our primary outcome data, 6-month weight loss. Complete case analysis (42% of participants) indicates that the TRIMM group achieved more weight loss than the standard care group (8.0 lb vs 1.3 lb, $p < 0.03$). The TRIMM group also achieved a significantly greater percent body weight loss (3.7% vs 0.6%, $p < 0.02$). Final results will be available early spring 2013.

We have begun collaborations with clinics and other organizations across the country to further develop and pilot TRIMM. We are actively seeking partners in implementing and advancing this promising initiative.

Strengths & Limitations

We observed encouragingly high engagement and satisfaction with our entirely automated TRIMM program. TRIMM's low-cost (<\$1/week for an individual), scalability, and reach (no smartphone required) further supports its potential as a tool in the battle against obesity.

Our study has limitations. The duration of the TRIMM program was only 6 months, and our study population was recruited exclusively from Baltimore churches. While 80% of participants returned for the intended 6-month follow-up, this trial had low rates of follow-up occurring within our protocol defined 6-month window due to challenges in transportation and scheduling; this resulted in an underpowered study.

Contact

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mHealth Activity: Data Collection
Title: BRIDGE II
PI: Jane Brown
Affiliation: Center for Communication Programs (JHU-CCP)
Dates: 2009 – 2014

Project Summary

BRIDGE II is a USAID/PEPFAR-funded HIV prevention project implemented in 11 districts in Southern Malawi with national reach through mass media. Working in so many districts, BRIDGE II has faced challenges with collecting timely data for reporting. This year BRIDGE II also planned to embark on a condom distribution initiative through community based distributors, further adding to its data collection needs.

To address these, BRIDGE II developed a mobile phone-based data collection system using FrontlineSMS. Java-based forms were created that could be used by all reporting partners. FrontlineSMS core functions were also used to capture and transfer data in searchable software programs. Teams comprising BRIDGE II district staff and local partners were then trained to use the system, once Frontline SMS was uploaded on their phones.

PEPFAR data collection is now being field tested, but the condom distribution tracking has been delayed due to condom supply issues in the country.

Country

Malawi

Focus

HIV Prevention

Project Goals

The goal of this activity is to improve the timeliness and ease of data collection and analysis for reporting and to provide feedback to the program in order to strengthen it.

Strengths

- SMS based data collection systems allow for more timely reporting
- Since the information can be downloaded directly into excel, and no longer has to be manually entered centrally from the hard copy received from the field, there is less room for error.

Limitations

- Additional training needs to be provided; data collectors must all have cell phones

Project Duration

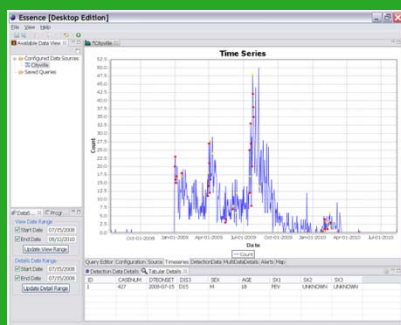
BRIDGE: 5 years

Mobile Data Collection: 2 years

Contact

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<http://jhuccp.org>



mHealth Activity: Disease Surveillance

Title:

SAGES: A Suite of Freely-Available Software Tools for Electronic Disease Surveillance in Resource-Limited Settings

PI:

Sheri Lewis, MPH

Affiliation:

Johns Hopkins University Applied Physics Laboratory

Project Summary

Many countries have experienced vast improvements in the collection, ingestion, analysis, visualization, and dissemination of public health data. Resource-limited countries have lagged behind due to challenges in information technology infrastructure, public health resources, and the costs of proprietary software. The Suite for Automated Global Electronic bioSurveillance (SAGES) is a collection of modular, flexible, freely-available software tools for electronic disease surveillance in resource-limited settings. One or more SAGES tools may be used in concert with existing surveillance applications or the SAGES tools may be used en masse for an end-to-end biosurveillance capability. This flexibility allows for the development of an inexpensive, customized, and sustainable disease surveillance system. The ability to rapidly assess anomalous disease activity may lead to more efficient use of limited resources and better compliance with World Health Organization International Health Regulations.

Focus

Electronic disease surveillance, particularly syndromic surveillance, holds promise to improve health security in resource-limited environments. Epidemiologists using electronic disease surveillance have the potential to detect anomalous disease activity earlier than traditional laboratory based surveillance.

Project Goals

The SAGES project is intended to enhance electronic disease surveillance capacity in resource-limited settings around the world. SAGES tools are organized into four categories: 1) data collection, 2) analysis & visualization, 3) communications, and 4) modeling/simulation/evaluation. Cognizant of work underway on individual surveillance systems components, e.g., collection of data by cell phones, our efforts focus on the development and integration of freely available, interoperable software tools that facilitate regional public health collaborations.

Strengths

- Flexible, freely available software tools for electronic disease surveillance in resource-limited settings.
- One or more SAGES tools may be used in concert with existing surveillance applications or the SAGES tools may be used en masse for an end-to-end biosurveillance capability
- The data are collected and stored only by the user, and remain under the sole control of the user at all times
- SAGES includes tools for two-way communication between public health officials and graphics that are exportable into common image formats

Contact

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2011-2013 Johns Hopkins University mHealth Publications (In order of publication)

2013

Chang LW, Njie-Carr V, Kalenge S, Kelly JF, Bollinger RC, Alamo-Talisuna S. Perceptions and acceptability of mHealth interventions for improving patient care at a community-based HIV/AIDS clinic in Uganda: A mixed methods study. *AIDS Care*. 2013 Jul;25(7):874-80. doi: 10.1080/09540121.2013.774315. Epub 2013 Mar 1. PMID: 23452084

Labrique AB, Vasudevan L, Chang LW, Mehl G. H₂pe for mHealth: more "y" or "o" on the horizon? *Int J Med Inform*. 2013 May;82(5):467-9. doi:10.1016/j.ijmedinf.2012.11.016. Epub 2012 Dec 29. PMID:23279850

Kaonga NN, Labrique AB, Mechael P, Akosah E, Ohemeng-Dapaah S, Sakyi Baah J, Kodie R, Kanter AS, Levine O. Using social networking to understand social networks: analysis of a mobile phone closed user group used by a Ghanaian health team. *J Med Internet Res*. 2013 Apr 3;15(4):e74. doi: 10.2196/jmir.2332. PMID: 23552721

Stephens J, Allen J. Mobile phone interventions to increase physical activity and reduce weight: a systematic review. *J Cardiovasc Nurs*. 2013 Jul-Aug;28(4):320-9. doi: 10.1097/JCN.0b013e318250a3e7. PMID 22635061

Dudas RA, Pumilia JN, Crocetti M. Pediatric caregiver attitudes and technologic readiness toward electronic follow-up communication in an urban community emergency department. *Telemed J E Health*. 2013 Jun;19(6):493-6. doi: 10.1089/tmj.2012.0166. Epub 2013 Apr 9.

Leite L, Buresh M, Rios N, Conley A, Flys T, Page KR. Cell Phone Utilization Among Foreign-Born Latinos: A Promising Tool for Dissemination of Health and HIV Information. *J Immigr Minor Health*. 2013 Feb 26. [Epub ahead of print]

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2012

Chang LW, Mwanika A, Kaye D, Muhwezi WW, Nabirye RC, Mbalinda S, Okullo I, Kennedy CE, Groves S, Sisson SD, Burnham G, Bollinger RC. Information and communication technology and community-based health sciences training in Uganda: perceptions and experiences of educators and students. *Inform Health Soc Care*. 2012 Jan;37(1):1-11. doi: 10.3109/17538157.2010.542530. Epub 2011 Feb 18. PMID: 21332303

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2012

Chang LW, Kagaayi J, Nakigozi G, Serwada D, Quinn TC, Gray RH, Bollinger RC, Reynolds SJ, Holtgrave D. Cost analyses of peer health worker and mHealth support interventions for improving AIDS care in Rakai, Uganda. *AIDS Care*. 2013;25(5):652-6. doi: 10.1080/09540121.2012.722600. Epub 2012 Sep 13. PMID:2297111.

Chander G, Stanton C, Hutton HE, Abrams DB, Pearson J, Knowlton A, Latkin C, Holtgrave D, Moore RD, Niaura R. Are smokers with HIV using information and communication technology? Implications for behavioral interventions. *AIDS Behav*. 2012 Feb;16(2):383-8. doi: 10.1007/s10461-011-9914-1. PMID:21390537

Campbell TC, Hodanics CJ, Babin SM, Poku AM, Wojcik RA, Skora JF, Coberly JS, Mistry ZS, Lewis SH. Developing open source, self-contained disease surveillance software applications for use in resource-limited settings. *BMC Med Inform Decis Mak*. 2012 Sep 6;12:99.

Lemay NV, Sullivan T, Jumbe B, Perry CP. Reaching Remote Health Workers in Malawi: Baseline Assessment of a Pilot mHealth Intervention. *Journal of Health Communication: International Perspectives*. 2012 May; 17(Supplement 1):105-117. doi: 10.1080/10810730.2011.649106

2011

Chang LW, Kagaayi J, Arem H, Nakigozi G, Ssempijja V, Serwadda D, Quinn TC, Gray RH, Bollinger RC, Reynolds SJ. Impact of a mHealth intervention for peer health workers on AIDS care in rural Uganda: a mixed methods evaluation of a cluster-randomized trial. *AIDS Behav*. 2011 Nov;15(8):1776-84. doi: 10.1007/s10461-011-9995-x. PMID:21739286

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Choudhri AF, Radvany MG. Initial experience with a handheld device digital imaging and communications in medicine viewer: OsiriX mobile on the iPhone. *J Digit Imaging*. 2011 Apr;24(2):184-9. doi: 10.1007/s10278-010-9312-7.

Internships

The Johns Hopkins University GmI is proud to host and partner with organizations worldwide to provide internship opportunities to students interested in the rapidly growing mHealth field.



Some of our past opportunities include:

- WHO Reproductive Health and Research
- mPower-Health in Bangladesh
- Interactive Research and Development in Pakistan
- VillageReach in Malawi
- Society for Elimination of Rural Poverty in India



GmI Scholar

Lavanya Vasudevan (2012), PhD, MPH, CPH
Associate, Department of International Health
Johns Hopkins Bloomberg School of Public Health

& Visiting Scholar
Duke Global Health Institute

I had the opportunity to consult for the World Health Organization (WHO) with Dr. Garrett Mehl during Summer 2012. I traveled to Karnataka, India to provide assistance on an mHealth project called DRISTHI. The project is a collaborative effort between WHO, Columbia University, and the Foundation for Research on Health Systems (FRHS) India. My role was to develop the evaluation plan for impact assessment of DRISTHI in 8 different outcome areas along the Reproductive, Maternal, Newborn and Child Health (RMNCH) continuum. Having just graduated from the MPH program at JHU, this was a great opportunity for me to apply the theoretical knowledge I had acquired from coursework in Epidemiology and Biostatistics to a real-world context. Prior to embarking on this project, I took the 4th term special studies and research course on *Advanced Topics in mHealth* taught by Ed Bunker and Professor Alain Labrique. As part of the course, students were asked to "propose, develop, and critique projects which they might intend to pursue in either their future student work and/or their future professional career". I used DRISTHI as a case example and received valuable feedback on research design from my peers and the instructors. As a consequence, I was able to successfully design a cluster randomized trial for the evaluation of DRISTHI. This plan is now being operationalized in two rural districts in Northern Karnataka.



While at Hopkins as an MPH student, I was fortunate to witness the inception of GmI and was the founding president of SIMRI - the Student Initiative for mHealth Research and Innovation. I learned a great deal about team work and leadership whilst working with the dedicated group of student leaders through managing GmI's seminar series and launching the mHealth journal club.

I currently serve as a technical consultant on mHealth for WHO and continue to work with Dr. Garrett Mehl and Prof. Labrique. Most notably, I work with the mHealth Technical and Evidence Review Group at WHO. I am also responsible for development and implementation of research tools that are used by the UN Innovations Working Group grantees. These tools cover a range of topics including constraints mapping, monitoring and evaluation, as well as project scale up and sustainability. In collaboration with GmI, I also developed the mHealth and ICT Framework for RMNCH - a visual communication tool that allows the mapping of mHealth projects along the RMNCH continuum. This Framework articulates the implementation of mHealth projects in terms of health system constraints addressed and the list of essential interventions that are strengthened, thereby making it a powerful tool for engaging government and other stakeholders.

I am grateful for the mentorship that I continue to receive from Professors Alain Labrique and Betty Jordan. It would have been impossible to receive a broad exposure to the global mHealth scene without support from GmI.

Gml Scholar

Shreya K Pereira (2012), MSPH, CPH
Consultant Analyst, Marie Stopes

Through the Global mHealth Initiative (Gml), I received two awards to support my practicum experiences during the second year of my Master's program. In the summer of 2012, I was offered the opportunity to intern at the Department of Reproductive Health and Research, at the World Health Organization (WHO) under the guidance of Dr. Garrett Mehl. Having interests in both monitoring and evaluation and mHealth in developing countries, this opportunity allowed me to closely work with two IWG grantees- Interactive Research and Development (IRD) and Cell Life, in the development of conceptual frameworks that incorporated their mHealth program activities. Mentorship from Dr. Garrett Mehl and Dr. Alain Labrique were invaluable in guiding my thinking and understanding of both the challenges and opportunities for evaluation and outcomes research in mHealth.



From Geneva, I travelled to Dhaka, Bangladesh, on a Global Health Established Field Placement to work with the Management Information System division of the Directorate General of Health Services, Ministry of Health. As an intern within the MoH, I was responsible for documenting the evaluation of the civil registration and vital statistics system of the country. Through this rapid assessment, I was able to meet development partners, government officials, and academic leaders and developed a critical understanding for the role of electronic and mobile technologies in responding to health system gaps-including a limited data, poor data quality, duplication of health records, and the need for a national identification system. This position in the government also allowed me to directly interact with mHealth stakeholders, and led to the development of an independent research project to determine key stakeholders' perspectives on the barriers and opportunities to scaling up mHealth innovations in Bangladesh. **These mHealth opportunities, which were made possible through the financial, academic, and professional support from Gml, have been critical in my growth as a public health professional.** These experiences have strengthened my passion and interests in evaluation methodologies and the potential to leverage mHealth technologies to answer systematic challenges in the developing world.

Shreya currently works as a consultant analyst for Marie Stopes International providing quantitative support for their ongoing family planning monitoring and evaluation efforts. In September, Shreya will begin a new role as a research assistant within the department of infectious disease epidemiology, at the London School of Hygiene and Tropical Medicine. Here she will provide quantitative research assistance in the evaluation of Merck's global initiative to reduce maternal mortality.

Gml Scholar

Beth Linas (2012), MHS

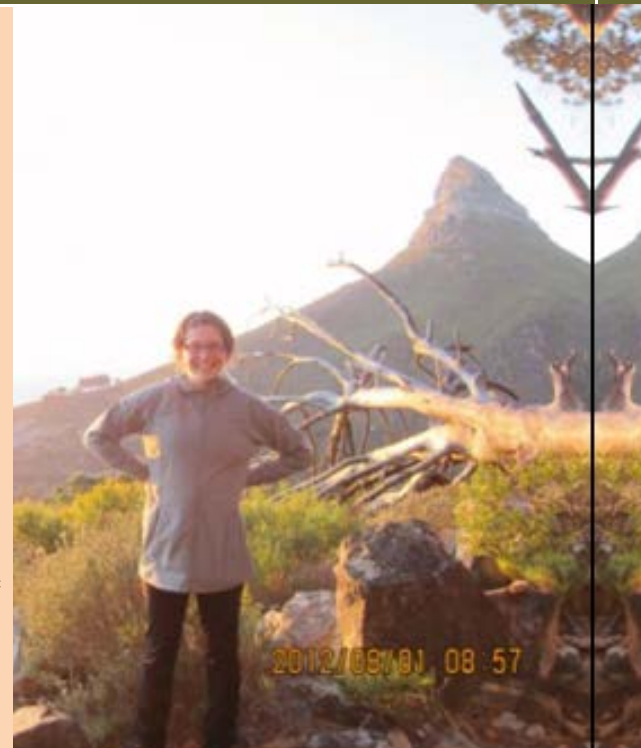
PhD Candidate Infectious Disease Epidemiology



During the summer of 2012 Beth had the opportunity to travel to South Africa and intern with the GSMA (Global system for Mobile Communications Association), the association of mobile operators devoted to supporting the deployment and promotion of the GSM mobile telephone system. The GSMA unites nearly 800 of the world's mobile operators, as well as more than 200 companies in the broader mobile ecosystem and reaches over 220 countries. She worked with the Mobile for Development mHealth Director, Craig Friderichs, on the Pan African mHealth Initiative. Her Work involved research on mHealth initiatives throughout Africa concerning Millennium Development Goals 4, 5 and 6.

Beth reviewed articles ranging from topics on wellness to prevention and examined the proliferation of mHealth services launched across Africa. She worked with Craig to develop a catalog of information from these publications and studies into online resources including: The mHealth trackers (a tool that captures information about current mHealth projects around the world) and the Impact Pathways (tools created to help evaluate outcomes and gaps in research).

Working in South Africa (SA) was truly eye opening on a personal and professional level. I observed that mobile phones and technology are used very differently in SA than in the United States. Cell phones are pervasive in Africa, yet Smart Phones are not. Few individuals can pay to send text messages, but in Africa all incoming text messages are free to receive. This unique feature of African cell culture allows for rapid penetration of populations who are at risk for several diseases but receive little care or have reduced access to care. Individuals often carry multiple cell phones which are often more valued than having a stable housing structure. mHealth in Africa is about using mobile technology to reach people in need of health care and to create opportunities for them to learn about their own health. Currently, America's mHealth culture focuses on complex apps and sensors to provide innovative care. Although we are moving beyond basic mHealth techniques that have proven successful in other countries (evaluation of these SMS programs is still desperately needed to ensure true success) I believe the simplest mHealth interventions and programs will have a huge impact on health outcomes in Africa as the field grows. I was fortunate to have the opportunity to research the beginnings of how mHealth can have the greatest impact.



GmI Scholar

Nadi Nina Kaonga (2011), MHS

MD Candidate at Tufts University School of Medicine

In the Summer of 2011, I received support from the Johns Hopkins Global mHealth Initiative to conduct original research in Ghana. The months preceding my departure were spent working closely with Drs. Alain Labrique and Orin Levine and colleagues at the Earth Institute at Columbia University to develop an innovative evaluation approach for an mHealth project. The assessment utilized social network analysis methods and was carried out in the Millennium Villages Project site of Bonsaaso, Ghana. This work has led to one publication and another is under consideration -- both are at leading journals in mHealth, informatics and health systems research. **Without the support of the GmI faculty and organization, I would not have been able to realize the full potential of the original research.**

Since then, I have gone on to work with the Department of Biomedical Informatics and the Earth Institute at Columbia University on mHealth initiatives across Sub-Saharan Africa and am also pursuing a medical degree at the Tufts University School of Medicine. I have also had the opportunity to lecture on mHealth as part of the Harvard Summer Program.



Gml Scholar

Sophia Magalona (2012), MPH
Data Manager at John Snow, Inc



For my internship I worked with Dr. Craig Friderichs and his team at GSMA to develop a visual library based on the GSMA mHealth Impact Pathways to display the mHealth research and literature housed in the Mobile for Development Intelligence site. It helped develop my knowledge management skills as the task required collecting, reviewing, and cataloguing the literature and defining the components of the Impact Pathways. I was also very lucky to attend the mHealth Summit in Cape Town as part of my internship where I was able to see mobile operators and the health industry come together and to know the current and emerging projects in the field. **Being interested in**

monitoring and evaluation (M&E), I was really excited about the opportunities of mHealth in M&E, such as data transparency and remote data management, and also the challenges, such as measuring impact.

I am currently working as a data manager for the Center for Health Information, Monitoring, and Evaluation at John Snow, Inc. I'm able to continue working in mHealth through a supply chain project I backstop that introduced an SMS and web-based resupply and reporting system called cStock.

Gml Scholar

Michael Tran (2013), MPH/MBA Candidate

Johns Hopkins Bloomberg School of Public Health

In efforts to reduce tuberculosis (TB) morbidity and mortality, Interactive Research and Development (IRD) is championing the effort to integrate information and communication technology to improve TB care. With an award from Johns Hopkins University's Center for Global Health, I am writing case studies on business models around mHealth initiatives with IRD and implementing partners. Throughout the summer, I'll study various deployments of mHealth implementations that have incorporated a sustainable social enterprise model in low-income communities with a high burden of undiagnosed TB.

I am currently situated in Karachi, Pakistan where I'm working closely with IRD at a very interesting time of their project. Having received funding from the TB Reach Initiative of the Stop TB Partnership, IRD is rolling-out their TBXpert project aimed to improve early case detection and diagnosis. Many mHealth components are integrated into the Karachi model of which include an instructional sputum collection tablet video, data collection via an android app on a mobile platform, and an OpenMRS data repository. Additional evaluation sites include Jakarta, Indonesia, Manila, Philippines, and possibly one additional site in Africa.

Field work is allowing me to experience first-hand how leveraging mobile and electronic technology can improve healthcare service and delivery in resource-constrained environments.

But while technological advances continue to have significant implications in the global health setting, efforts to scale such services remain a challenge. In order to successfully transition from "seed" to "scale" funding, it is important to address sustainability-- where health drives technology instead of the other way around.

Gml Scholar

Youngji Jo (2012), PhD Candidate

Johns Hopkins Bloomberg School of Public Health

Through the Global mHealth Initiative (GmI), Youngji was offered an opportunity to intern in Geneva with a World Health Organization (WHO) mHealth costing study. Her research involved public health costing tools and practical mechanisms such as Total Cost Ownership (TCO). Additionally, during her internship she participated in a community-based mHealth project in India (Dimagi-Save the Children, India Health Action Trust) to assess an amended TCO model as a framework for mHealth costing and economic evaluation. Youngji is now entering her Third Year as a doctoral student, and is focusing on a community-based mHealth program to improve maternal and newborn health service in rural Bangladesh.

Trained as an engineer, Youngji studied international development with a background in technology and business Management. She found public health to be an appropriate field in which to apply technology based solutions.



“My Time with the WHO has raised many important questions and has inspired me to expand my research interests. **I now view mHealth as a new and powerful innovation in the global health domain.** I will continue to incorporate mHealth into my studies and have maintained a focus on impact Evaluation and cost-effectiveness. As a nascent tool, mHealth, has extraordinary potential for Saving lives and improving the quality of life in the developing world. I believe that evidence-based policy and investment decisions could ensure its success.”



Gml Student Entrepreneurship



Henry Li, Joseph Abrahamson, Michael Lin, and Ralph Passarella came together as medical and graduate students at Johns Hopkins to solve a problem they had each experienced in their own careers - researchers with the domain expertise to solve clinical and public health problems having trouble accessing the technological resources needed to conduct cutting edge research. The four of them founded Reify Health in May 2012 to lower the barrier to entry for researchers and scientists to use technology in their research starting with the exploding field of mobile health. In their 12 months together, the team has deployed software for researchers at major universities across the country; Reify was one of seven companies selected to receive a Fellowship from Rock Health, and has successfully launched or completed over a dozen research trials.



The company's first product, the Reify Health Lab Bench, is a web application that provides users, such as clinical and public health researchers, with the tools and infrastructure to build, test, and deploy interactive, automated, and customizable text message algorithms for health behavioral change interventions. In a year's time, Reify has completed 3 randomized controlled trials with researchers, launched 10 additional trials, and has deployed its technology to over 4000 trial participants simultaneously in three time zones and two languages. Reify's customer base includes researchers from Johns Hopkins University Schools of Medicine and Public Health, Harvard, Stanford, the Children's National Medical Center, Brown, Oklahoma State, and Michigan State. Trials to date have used text messaging and email to engage patients across the clinical care spectrum, including conditions such as diabetes, obesity, smoking cessation, HPV vaccination adherence, STD management, depression, young adult education, sedentary behavior, and teen violence.

Services to the University Community

- o **Increase Capacity:** The GmI strengthens JHU capacity in mHealth by providing access to mHealth resources to support education, research, and practice for students, staff, and faculty across JHU Institutions. Key among these resources is an updated database of faculty mHealth activities (ongoing and planned) across JHU to promote interdisciplinary faculty collaborations and student opportunities.
- o **Provide access to information:** The GmI provides easy access to information regarding mHealth technologies and solutions; the Initiative coordinates Initiative-led functions, meetings, working groups and consultancies, and develops and maintains the Initiative's internet, social media, and traditional information materials.
- o **Introduce a mHealth curriculum:** In collaboration with university-wide curriculum committees, the GmI is developing and enhancing new and existing courses with relevant mHealth content. To bolster this initiative, a database of "mHealth Lecturers" is being developed.
- o **Provide training and internship opportunities:** The GmI strives to increase the capacity of JHU students, staff, and faculty in mHealth by developing grants for domestic and international training, as well as providing short-term internships at field sites to encourage practical, hands-on experience.
- o **Facilitate collaborations:** The GmI matches outside requests for consultations and expert advice with faculty of students possessing the most appropriate specializations, background, and/or knowledge. In addition, the GmI works with faculty to identify appropriate tools and technologies to enhance their research and provides assistance in adapting existing open-source materials for specific needs.
- o **Enable Knowledge dissemination:** The GmI encourages and facilitates students, staff, and faculty participation in mHealth conferences, highlighting JHU research and innovation.

Services to the mHealth Ecosystem

- o **Provide leadership:** The GmI serves as a Center of Excellence at JHU to which external agencies interested in mHealth can refer. Members of the Initiative provide, through their activities, leadership across the mHealth continuum—from early-stage technology innovation to high-impact health system solutions.
- o **Spur innovation:** GmI faculty seeks to rapidly design, deploy and test pilot innovations, bring them to scale, and evaluate their public health impact within the most challenging settings of the world. GmI faculty and staff provide expert guidance on the development and implementation of mHealth-specific measurement and evaluation tools for existing and new projects and scalable programs including data systems programming, data stream management, evaluative study design, and other research needs.
- o **Translate evidence to policy:** To inform mHealth policies and programs, the GmI critically evaluates and disseminates evidence to policy makers through position papers or policy statements on mHealth strategy and program impacts and will engage with the non-profit sector and international implementing agencies to promote best practices. These activities emphasize contextually appropriate interventions that target health outcomes and problems of significance to communities, governments, and global health agencies (including non-governmental agencies, international aid programs, disease control programs, etc.).
- o **Provide comprehensive mHealth resource base:** The GmI curates and organizes, for broad audiences in all health spheres, resources in the published peer-reviewed and non-formal literature related to the design, conduct, and evaluation of mHealth intervention strategies for global health.
Located under resources: (www.jhumhealth.org)



Johns Hopkins Technology Transfer

Leading Academia into Mobile Innovations

Since 2011 JHTT has seen an increased interest in mobile solutions at Johns Hopkins, receiving approximately 50 mobile-based reports of inventions to date. In response to the growing demand by the Hopkins community, JHTT has developed a process in which Johns Hopkins innovators are able to distribute their applications through mobile distribution platforms such as the App Store, iBookstore, and Google Play. As an emerging leader in the mobile solutions space, JHTT participated in the discussion and provided feedback on the newly created FDA Draft Guidance for Mobile Medical Applications. This prompted the set-up of commercial institutional accounts within the Apple and Google Play markets. Moreover, JHTT is also set-up to handle attachments and accessories that utilize mobile platforms. In FY 2013, two Hopkins mobile innovators received \$100,000 each from TEDCO's Maryland Innovation Initiative to fund the development of a mobile-based medical device and a music education app. Moreover, JHTT is also in the process of spinning its first two start-up companies in the mHealth space. If you are interested in developing a mobile innovation please contact Montserrat Capdevila at mcapdev1@jhu.edu.



The X Team: Interdisciplinary Collaboration in Action

Qualcomm issued a challenge for an international competition to develop the next generation of self-diagnosis: a single, unified system to allow consumers to easily manage their own health on a daily basis, by continuously monitoring key vitals, and diagnosing common conditions so that the consumer can seek out appropriate medical attention. They call this challenge “Tricorder” X Prize; Johns Hopkins University Whiting School of Engineering formed the X Team, and partnered with the Center for Bioengineering Innovation and Design (CBID) to bring together a student team from across the Hopkins Community to develop an entry to compete for the \$10 million prize purse.



The scope of work demands that students from a variety of disciplines are needed to succeed. They sought Biomedical Engineers, Electrical and Mechanical Engineers, Materials Scientists, Computer Scientists, Business, Finance as well as Writing and Marketing students – everyone. Together, they believe that Hopkins can make strides in the development of commercial diagnostics, bringing healthcare to your fingertips.



The best partner for
med tech innovation.

By bringing together the best minds in the industry to solve this problem, the Prize has sent a message: it's time to bring healthcare home. And by having these minds compete for a ten million dollar purse, it's promoting the most effective, innovative, and market-ready solutions out there.

And that's great news—for consumers, for industry, for medicine—for everyone.

The revolution of self-diagnosis is coming. And we want to make sure Johns Hopkins is at the forefront, by creating our own solution to this challenging problem.

QUALCOMM
TRICORDER X PRIZE

\$10,000,000 on the line.
And not a dime wasted.

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With Generous Support from:

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