Compendium of mHealth Projects

The mHealth project case studies are organized by primary application area, from least specialized (education and awareness) to most specialized (diagnostic and treatment support). Although several projects offer multiple applications, they are categorized here by their more specialized function.

Education and Awareness

1. Freedom HIV/AIDS Project, India
2. Learning about Living, Nigeria
3. HIV/AIDS Video Distribution by Mobile Phone, Georgia
4. HIV Confidant, South Africa
5. Project Masiluleke, South Africa
6. Text to Change (TTC) – HIV Prevention through SMS Quiz, Uganda

Remote Data Collection

7. Cell-PREVEN, Peru
8. Community Accessible and Sustainable Health System (Ca:sh), India
9. Community Health Information Tracking System (CHITS), Philippines
10. Dokoza System, South Africa
11. EpiHandy, Uganda, Zambia, Burkina Faso
13. Integrated Healthcare Information Service through Mobile Telephony (IHISM), Botswana
14. Media Lab Asia - Shared Resource for Rural Health Management and Information Infrastructure, India
15. Mobile-Based Primary Healthcare Management System, India
16. Map of Medicine for Kijabe Hospital, Kenya
17. Nokia Data Gathering, Brazil
18. PDAs for Malaria Monitoring, Mozambique
19. Phones for Health, Rwanda
20. TRACnet, Rwanda
Remote Monitoring
21. Cell-Life Project, South Africa
22. Chinese Aged Diabetic Assistant (CADA), China
23. Colecta-PALM, Peru
24. Mashavu: Networked Health Solutions for the Developing World, Tanzania
25. MediNet Healthcare Management System, Trinidad and Tobago
26. Mobile Care, Support and Treatment Manager (MCST), India
27. Mobile Phones for Health Monitoring, India and the United Kingdom
28. Phoned Pill Reminders for TB Treatment, Thailand
29. SIMpill Solution for TB, South Africa
30. Virtual Health Pet, Brazil

Communication and Training for Healthcare Workers
31. Enhancing Nurses Access for Care Quality and Knowledge through Technology (ENACQKT), the Caribbean
32. HealthLine, Pakistan
33. Mobile HIV/AIDS Support, Uganda
34. Primary Healthcare Nursing Promotion Program, Guatemala
35. Uganda Health Information Network (UHIN), Uganda

Disease and Epidemic Outbreak Tracking
36. Acute Encephalitis Syndrome Surveillance Information System (AESSIMS), India
37. Alerta DISAMAR, Peru
38. FrontlineSMS, Worldwide
39. GATHER, Uganda
40. Handhelds for Health, India
41. Remote Interaction, Consultation, and Epidemiology (RICE), Vietnam
42. Tamil Nadu Health Watch, India

Diagnostic and Treatment Support
43. Cell Phone Applications for Clinical Diagnostic Therapeutic and Public Health Use by Front Line Healthcare Workers, Mozambique
44. Digital Inclusion Kit in Health and Higher Education, Argentina
45. Ericsson and Apollo Hospitals Initiative, India
46. HIV Mobile Decision Support, South Africa
47. M-DOK: Mobile Telehealth and Information Resource System for Community Health Workers, Philippines
48. Mobile E-IMCI, Tanzania
49. Mobile Telemedicine System, Indonesia
50. Nacer, Peru
51. Teledoc - Jiva Healthcare Project, India
Education and Awareness

Project 1: Freedom HIV/AIDS Project

Country: India

Sponsoring Organization and Partners: ZMQ Software Systems and Delhi State AIDS Control Society

Application Area: Education and Awareness

Communicating information in an engaging, fun way is a critical ingredient of success in mHealth programs. The Freedom HIV/AIDS games—launched in India in December 2005—have effectively enhanced HIV/AIDS awareness by applying this principle. The games are tailored to target users from different social and demographic groups and run on more than 100 types of mobile phones, from the most basic to the most sophisticated. ZMQ Software Systems, the maker of the games, believes the “Play-and-Learn method [the games employ]...makes learning not only exciting and engaging but helps in the enhancement and retention of knowledge.” This belief has been confirmed by the games’ popularity: by March 2006, only four months after the launch date, more than ten million games had been downloaded, many by mobile phone subscribers in small cities and towns, the most vulnerable populations.

Reference sources:
http://www.freedomhivaids.in/FreedomHivAids.htm
http://www.zmqsoft.com/

Project 2: Learning About Living

Country: Nigeria


Application Area: Education and Awareness

mHealth programs that take a holistic approach to public health challenges often have the best chance of success. Learning about Living, a collaborative pilot program, does this by providing young Nigerians with an anonymous forum to learn about health, AIDS, sex, relationships, personal development, and living skills. The program includes an interactive eLearning tool based on the Nigerian Family Life and HIV/AIDS Education (FLHE) curriculum, as well as the mobile phone-based programs MyQuestion and MyAnswer. With MyQuestion, Nigerian youth can submit questions via text message, a telephone hotline, or online. Questions are promptly answered by trained volunteers. MyAnswer sends out a monthly question (e.g., what is the difference between HIV and AIDS?) and selects winners based on responses submitted via the web or text message. The two-year project, launched in February 2007, was piloted in three locations in Nigeria, and saw early success. The service received more than 2,500 questions in the first five days and received 10,000 questions in the first month.

Reference sources:
http://blog.whoiswho.de/stories/31872/
http://mobileactive.org/ask-about-sex-text-teenagers-learn-about-living-nigeria
http://uk.oneworld.net/article/archive/9789
http://www.comminit.com/en/node/269380/38
http://www.learningaboutliving.com/south/about
http://www.youtube.com/watch?v=UCHPH-Nx-hc
Project 3: HIV/AIDS Video Distribution by Mobile Phone

**Country:** Georgia  
**Sponsoring Organization and Partners:** Save the Children and UNICEF  
**Application Area:** Education and Awareness

HIV/AIDS receives little attention in regions such as the Caucasus, where the topic is taboo and many people are uninformed about the disease and its causes. Save the Children and UNICEF collaborated in January 2008 to produce a 20-minute film about HIV/AIDS aimed at educating young people in Georgia. The film content is compelling, featuring well-known young actors who portray the potential health risks of everyday decisions and behaviors. Taking advantage of the popularity of mobile phones among young Georgians, Save the Children and UNICEF converted the film into a format that is viewable on mobile phones, at which point it was sent to thousands of young people around the country, who were encouraged to pass it on to friends. The project was praised for its novelty and the ease of dissemination. This innovative social distribution model for health information had never been used in Georgia before, but is sure to be replicated in future initiatives.

Reference source:  
http://www.unicef.org/ceecis/media_8237.html

Project 4: HIV Confidant

**Country:** South Africa  
**Sponsoring Organization and Partners:** Dimagi, Inc. (privately held software company)  
**Application Area:** Education and Awareness

In places where HIV-positive status remains a stigma, successful outreach efforts must address people’s privacy and confidentiality concerns. The HIV Confidant project aims to encourage HIV/AIDS testing by ensuring secure distribution of test results through the use of handheld computers and standard encryption techniques. Dimagi, a US-based software company, implemented the HIV Confidant project in 2003 at the Africa Centre for Health and Population Studies in South Africa. In the pilot, 45,000 adults were tested for HIV, and results were shared with participants through a secure PDA-based system. People who were tested were provided with a unique ID code, and results were given only to those who provided the code. The HIV Confidant system runs on Palm m500 and Handspring Visor PDAs, but can be adapted for non-Palm devices for greater flexibility and extended reach.

Reference sources:  
http://www.dimagi.com/content/hiv-confidant.html  
http://www.technologyreview.com/computing/13776/?a=f
Project 5: Project Masiluleke

Country: South Africa

Sponsoring Organization and Partners: Praekelt Foundation, iTeach, National Geographic, Nokia Siemens Networks, MTN, Ghetto Ruff, Children of South African Legacies, Aricent and frog design

Application Area: Education and Awareness

See case study on page 22.

Reference sources:
http://newsvote.bbc.co.uk/2/hi/technology/7688268.stm
http://www.poptech.org/project_m/

Project 6: Text to Change (TTC) – HIV Prevention Through SMS Quiz

Country: Uganda

Sponsoring Organization and Partners: Text to Change (TTC), Zain (previously Celtel), the local NGO AIDS Information Centre (AIC), the Dutch Ministry of Foreign Affairs and Merck

Application Area: Education and Awareness

See case study on page 25.

Reference sources:
http://www.texttochange.com
Interviews with the Text To Change team

Remote Data Collection

Project 7: Cell-PREVEN

Country: Peru

Sponsoring Organization and Partners: Universidad Peruana Cayetano Heredia (Peru), Imperial College (London), University of Washington (Seattle) and Peru’s Ministry of Health

Application Area: Remote Data Collection

When it comes to effective data collection in remote areas of the developing world, less is often more. Cell-PREVEN was created to allow access to real-time data to members of the healthcare ecosystem in Peru. This interactive voice response system enables health workers in the field to collect and transmit data via basic mobile phones. The data is aggregated in a centralized database and made available to medical professionals, and the system is designed to send SMS or e-mail alerts if certain symptoms are recorded. During a three-month pilot test, 797 reports were collected and 374 adverse events were recorded—30 severe enough to trigger an SMS alert to a team leader. The pilot researchers believe that Cell-PREVEN demonstrates that “cell phones are a feasible means of collecting and reporting data in real-time in remote communities...it’s not necessary to have the latest Palm Pilot or Tablet PC to create a sophisticated public health surveillance system.”

Reference sources:
http://www.prevenperu.org/preven/
http://www.prevenperu.org/preven/presentation_curioso.pdf
http://faculty.washington.edu/wcurioso/cellpreven.pdf
Project 8: Community Accessible and Sustainable Health System (Ca:sh)

**Country:** India

**Sponsoring Organization and Partners:** Media Lab Asia (part of the Ministry of ICT India), Dimagi, Inc. (privately-held software company) and All India Institute of Medical Sciences

**Application Area:** Remote Data Collection

Large, rural areas in developing countries often lack comprehensive collection of health and population data. In Ballabhgarh, India, Media Lab Asia community health workers used an open source software application on PDAs called Ca:sh—the Community Accessible and Sustainable Health system—to collect medical and demographic data. The pilot aimed to improve maternal and child health, and used Compaq iPAQs, which could run a MySQL database capable of storing up to 7,000 records. An evaluation of the five-month pilot “indicated high acceptance of the technology and reduction in total time for entry of data...the [health workers] were satisfied with the user interface and were able to depend entirely on the handheld, replacing their existing paper-based records.” Media Lab Asia now is exploring future applications, such as mobile surveys and disease-case management, and has ported the software to less expensive Palm OS-based devices.

Reference sources:
- http://www.dimagi.com/content/cash.html
- http://www.medialabasia.in/healthcare.html

Project 9: Community Health Information Tracking System (CHITS)

**Country:** Philippines

**Sponsoring Organization and Partners:** United Nations Development Program (UNDP) and Asia-Pacific Development Program (APDP)

**Application Area:** Remote Data Collection

Patient education is not the only challenge to improving health in the developing world—often health workers are not equipped with the information they need to best serve patients. The Community Health Information Tracking System, or CHITS, is an open source program that helps to ‘train the trainers’ by facilitating data collection and transmission in rural areas. The system allows community health workers to send SMS messages to report injuries and receive training on health surveillance via their mobile phones. The CHITS open source community believes they should teach local health workers “how to use the information system, [and] allow them to gain insight into their condition…so that they can decide to take action and be proactive in empowering others to do the same.” Like many mHealth projects, CHITS had found that empowering local communities with information and enabling two-way data flows is an effective strategy.

Reference sources:
- http://www.stockholmchallenge.se/datacommunity_health_informat

Credit: UN UNHCR
Project 10: The Dokoza System

**Country:** South Africa

**Sponsoring Organization and Partners:** Dokoza, State Information Technology Agency (SITA), Centre for Public Service Innovation (CPSI), Centre for Scientific and Industrial Research (CSIR) and the Meraka Institute, with the cooperation of South Africa’s National Department of Health

**Application Area:** Remote Data Collection

Integrating mobile data collection solutions with existing health information systems is essential to advancing patient care. The Dokoza system in South Africa seeks to meet this need. It is an SMS-based mobile system designed to fast-track and improve critical services to HIV/AIDS and TB patients. Dokoza relies on SIM cards that can be used across networks, which interact with a more complex back-end system that integrates with existing hospital information systems. The integration with existing infrastructure offers the possibility of dramatic improvements to existing patient health information records, and in the 2004 pilot, both doctors and patients found the system to be user-friendly. Challenges encountered during the pilot include the duplication of data entry in instances where paper-based systems already existed, and staff shortages that hampered information collection. Despite the promise of this technology, little new data exists on its impact since the end of the pilot.

Reference sources:
- http://www.changemakers.net/node/1014
- http://www.dokoza.co.za/content/patent.asp

Project 11: EpiHandy

**Country:** Uganda, Zambia, Burkina Faso

**Sponsoring Organization and Partners:** Center for International Health, Norway

**Application Area:** Remote Data Collection

Health data collection in the developing world is often hampered by the high costs and inefficiencies of traditional large-scale paper-based surveys. The EpiHandy tool, a mobile health data collection and record access program enabled by PDAs, helps to mitigate these issues. EpiHandy has been deployed in many countries and by many different organizations since its first release in 2003, and has been used in multi-year studies in Uganda, Zambia, and Burkina Faso. In the Uganda study, mobile phones were deployed to participating clinics and Ministry of Health experts trained the local staff on using the open source JavaRosa software to fill and submit medical forms. The data from the forms was transmitted across the standard services available on the local mobile network. EpiHandy has yielded positive results during a five-year assessment in which 14 interviewers collected information on breastfeeding habits and child anthropometry in rural areas of eastern Uganda. Outcomes include greatly reduced data entry errors and broad user acceptance, as well as cost effectiveness relative to traditional paper-based surveys, increasing the potential for this already successful solution to scale further.

Reference sources:
- http://www.epihandy.com/
- http://www.cih.uib.no/
Project 12: EpiSurveyor

Country: Kenya, Uganda, Zambia (and 20 countries in sub-Saharan Africa by end of 2008)

Sponsoring Organization and Partners: The United Nations Foundation and Vodafone Foundation Technology Partnership, the World Health Organization and DataDyne

Application Area: Remote Data Collection

A lack of health data is among the greatest obstacles facing health decision makers. One of the largest and most heralded mHealth projects, EpiSurveyor, developed by non-profit software provider DataDyne, enables public health and development professionals to create, share, and deploy health surveys and other forms on mobile devices. The program runs on free and open software, is easy to use, and can be downloaded to handheld devices to be used by workers in the field. Successful pilot programs in two countries resulted in more timely and accessible healthcare data, making it easier to strengthen district level healthcare programs like immunizations and responses to disease outbreaks. An added benefit is that country health workers become fully self-sufficient in programming, designing, and deploying health surveys, eliminating the need to contract outside consultants. Building upon the success of the initial programs, in fall 2008 the partners announced that with the financial backing of the United Nations Foundation and Vodafone Foundation, and the scaling and expertise of the WHO and participating ministries of health, the EpiSurveyor-based mHealth program would be rolled out in a further 20 countries in sub-Saharan Africa.

Reference sources:
- http://www.datadyne.org/?q=episurveyor/home

Project 13: Integrated Healthcare Information Service Through Mobile Telephony (IHISM)

Country: Botswana

Sponsoring Organization and Partners: Microsoft Research Digital Inclusion Program and the University of Botswana

Application Area: Remote Data Collection

In those developing countries boasting near-saturation of mobile phones, the potential benefits of mHealth strategies are the greatest. Microsoft and the University of Botswana are taking advantage of mobile telephony’s broad reach in the country to develop an Integrated Healthcare Information Service (IHISM). The system serves both health workers and the general public. It uses a mobile phone-based software application to allow health workers to capture, store, process, transmit, and access patient records. This results in lower costs and greater efficiency by eliminating redundancy and reducing the amount of time devoted to data input. The public can also turn to IHISM for information: individuals pose frequently asked questions about HIV/AIDS via SMS messages and receive a reply straight to their mobile phones. The project partners have identified several challenges, including localization and customization for illiterate users, but overall feel that the system has the potential to become a valuable tool and take on increased scope.

Reference sources:
- http://research.microsoft.com/enus/um/redmond/events/fs2006/presentations/40_Nyongesa_071806.ppt
Project 14: Media Lab Asia – Shared Resource for Rural Health Management and Information Infrastructure

Country: India

Sponsoring Organization and Partners: Media Lab Asia (part of the Ministry of ICT, India)

Application Area: Remote Data Collection

The immense size of India, coupled with the fact that approximately 70% of its one billion citizens live in rural areas, makes affordable and flexible health data collection techniques a necessity. India’s Media Lab Asia is working on a project—Shared Resource for Rural Health Management and Information Infrastructure—to improve health data collection and analysis to better serve the needs of its citizens. The mHealth component of this project is focused on data collection. Health workers will use handheld devices to collect a wide array of data in the field—medical history, demographics, immunizations, and instances of disease. This data will be transmitted from the devices to the health information system database, where it can be accessed on a real-time basis. The solution will be implemented initially in the Mallapuram District of Kerala in India. No exact dates for project implementation have been published.

Reference source:
http://www.medialabasia.in/healthcare.html

Project 15: Mobile-Based Primary Healthcare Management System

Country: India

Sponsoring Organization and Partners: Center for Development of Advanced Computing (CDAC)

Application Area: Remote Data Collection

Primary Health Centers are critical in rural India as they provide direct patient care and link patients to the national health system via referrals. The Center for Development of Advanced Computing (CDAC) is developing a ‘Mobile-Based Primary Healthcare Management System’ to strengthen primary health centers in both rural areas and urban slums in India. The CDAC was created in 1988 and is a research and development society overseen by India’s Department of Information and Ministry of Communications and Information Technology. A key component of the Mobile-Based Primary Healthcare Management System will be an SMS-based interface, which will allow patients to transmit information to or receive information from a central database via a basic mobile phone. Medical staff and health officials will be able to access this database from more sophisticated, web-enabled mobile phones. The project is in the development stage, but is expected to have a broad geographic scope.

Reference sources:
http://www.w3.org/2008/02/MS4D_WS/papers/cdac-mobile-healthcare-paper.pdf
http://www.cdacbangalore.in
**Project 16: Map of Medicine for Kijabe Hospital**

**Country:** Kenya  
**Sponsoring Organization and Partners:** UK National Health Service (NHS), Cisco’s Internet Business Solutions Group (IBSG)  
**Application Area:** Remote Data Collection

Doctors in rural areas are often forced to treat individual patients with little or no information about resources in neighboring areas, impeding them from providing optimum care. A joint project was launched in Kenya in 2006 to address this problem. The project gives Kenyan health workers at Kijabe Hospital access to the Map of Medicine, a medical information database. The Map of Medicine is a web-based tool that provides comprehensive, up-to-date information on diagnosis and treatment, presented in easy-to-use flowcharts or ‘care pathways.’ Doctors participating in the pilot study were given PDAs and access to data on HIV/AIDS, TB, malaria, abdominal pain, diarrhea, and typhoid fever. Results were promising: hospital staff reported that the data access and entry via the PDAs has led to greater efficiency, more time with patients, and reduced administrative costs.

Reference sources:  
http://www.cisco.com/web/about/ac79/docs/wp/Kijabe_Hospital_CS_1009a.pdf  
http://www.medic-to-medic.com/

**Project 17: Nokia Data Gathering**

**Country:** Brazil  
**Sponsoring Organization and Partners:** Nokia, Amazonas State Health Ministry  
**Application Area:** Remote Data Collection

Please see case study write up on page 28.

Reference source:  
http://www.nokia.com/nokiadatagathering

**Project 18: PDAs for Malaria Monitoring**

**Country:** Mozambique  
**Sponsoring Organization and Partners:** AED-SATELLIFE  
**Application Area:** Remote Data Collection

Malaria is the prime cause of morbidity and mortality in much of sub-Saharan Africa. Prevention and treatment of the disease are essential to reducing its effects on the population, and the rapid capture of accurate information is a key part of these efforts. The PDAs for Malaria Monitoring project, based in Mozambique, deploys PDAs and GPS devices to increase the ability of health workers implementing malaria programs to make informed decisions. The workers use the devices to collect data and transmit it via the GPRS network to a central database. A technical team then maps the geographic data to public health and resource information. Despite some technical challenges, the results of the project have been positive. Users are able to use the PDAs without difficulty, new data tools and training programs have been created, and information gathered has helped the Health Ministry to influence and shift the allocation of resources.

Reference sources:  
http://www.crdi.ca/iicr/ev-118198-201_102534-1-IDRC_ADM_INFO.html  
Project 19: Phones for Health

Country: Rwanda

Sponsoring Organization and Partners: The GSMA Development Fund, the U.S. President’s Emergency Plan for AIDS Relief (PEPFAR), Accenture Development Partnerships, Motorola, MTN and Voxiva

Application Area: Remote Data Collection

Most mHealth programs strive to leverage the growth and penetration of mobile phones in developing countries to strengthen health systems and improve health outcomes. Phones for Health, a large public-private partnership, is pursuing this goal using a system developed and deployed by Voxiva at health ministries in Peru, India, and Rwanda. The program enables health workers in local communities to use a standard handset equipped with a downloadable application to collect and enter health data. Once the data is entered and transmitted, it can be integrated into health information systems and accessed by health officials in real time at all levels using the Internet. The system also allows workers to order medicines, send public health alerts, and download treatment guidelines. The Rwanda pilot follows the successful deployment of a related system—TRACnet—that manages the country’s HIV/AIDS program. Rollouts are planned for other areas of the health sector in Rwanda and other African countries.

Reference source:

Project 20: TRACnet

Country: Rwanda

Sponsoring Organization and Partners: TRAC (Treatment and Research AIDS Center)—an institution of the Ministry of Health of Rwanda, Voxiva and the US Center for Disease Control and Prevention (CDC)

Application Area: Remote Data Collection

TRACnet is a comprehensive data entry, storage, access, and sharing system created in Rwanda in 2005 by the Treatment and Research AIDS Center (TRAC), part of the Rwandan Ministry of Health. The system is used to manage critical information on HIV/AIDS patients and monitor anti-retroviral treatment (ART) programs nationwide. Medical personnel can use TRACnet to monitor drug distribution, create and submit reports electronically, and access the most up-to-date information on HIV/AIDS care and treatment. TRACnet was designed for use with all types of technology and information systems, but today, 90% of the system’s users access it via mobile phones, rather than more expensive and less reliable computers and Internet connections. Results of the gradual deployment and development of TRACnet have been promising. By the end of 2005, 21 medical centers had switched from inefficient paper-based systems to TRACnet’s electronic records system. By 2007, TRACnet covered all 168 health facilities that provide ART treatment, and there were plans to extend the system to 400 more health facilities. Rwanda’s Ministry of Health also hopes to expand the system to cover other chronic illnesses.

Reference sources:
http://www.tracrwanda.org.rw/index1.htm
Excerpts from “Local Case Studies from Africa” prepared by the Department of Economic and Social Affairs, Division for Sustainable Development, United Nations
Remote Monitoring

Project 21: The Cell-Life Project

Country: South Africa

Sponsoring Organization and Partners: The University of Cape Town, the Cape Peninsula University of Technology and Cell-Life

Application Area: Remote Monitoring

Providing home-based care for HIV/AIDS is critical in the African context, where the stigma attached to the disease often discourages patients from visiting health facilities. Cell-Life, a social enterprise based in South Africa, is developing innovative approaches to home care with their ‘Aftercare’ program. In this program, Aftercare health workers monitor patients whom they visit at home. Workers use data-enabled mobile phones to record information about the patients’ medical status, medication adherence, and other relevant factors. The data are then transmitted via SMS to the central Cell-Life database, where care managers use a web-based system to access and monitor incoming patient information. Initial program results were encouraging, but significant challenges remain. Although South Africa’s mobile penetration rate is high, the system is currently used on only one network using prepaid accounts, and the software is not yet available in any of South Africa’s national languages other than English. Cell-Life is currently working to address these issues so the program can be adopted on a national scale.

Reference sources:
http://mobileactive.org/files/MobilizingSocialChange_full.pdf

Credit: Mobiles in Malawi/Josh Nesbit
Project 22: Chinese Aged Diabetic Assistant (CADA)

**Country:** China

**Sponsoring Organization and Partners:** Microsoft Research, researchers from St Louis University, Old Dominion University, Beijing Medical University and Peking University First Hospital

**Application Area:** Remote Monitoring

Economic development and the resultant lifestyle changes are contributing to rapidly rising diabetes rates in fast-growing nations such as China. To counter this trend, Microsoft Research and a group of researchers from several universities and Chinese medical centers are developing a smartphone-based self-management and support system for elderly diabetics in China. The project will use smartphones to send elderly diabetics recommendations and guidelines related to physical activity, glucose and blood pressure monitoring, weight measurement, and diet. Patients will be trained to enter and send data on glucose levels, and doctors will be able to track patient data and graphically display data for patients. The system designers will use a user-centered design approach to develop software that reflects the preferences and capabilities of the targeted population to achieve maximum usability. The project’s software will be available free of charge and will work on PDAs and smartphones that run the Windows Mobile operating system.

Reference sources:

Project 23: Colecta-PALM

**Country:** Peru

**Sponsoring Organization and Partners:** The University of Washington, the Peruvian University of Cayetano Heredia and two Peruvian health clinics (Via Libre and Impacta)

**Application Area:** Education and Awareness, Remote Monitoring

Patient-based mHealth strategies must have patient buy-in to succeed. Colecta-PALM, an open source, secure web-based application that delivers Spanish-language surveys via audio on PDAs, was designed to ensure patient buy-in. A pilot test of this technology was conducted with HIV/AIDS patients in Peru. The patients used PDAs to enter and submit information regarding their ART adherence and behaviors that could potentially lead to additional HIV transmission. Patients’ medicine compliance and behaviors were assessed and different types of feedback were provided depending on the user’s risk profile. Of the 31 patients tested, 27 (74%) reported openness to using PDAs for HIV treatment support. The researchers in this study believe that these results “suggest that PDAs may be a culturally appropriate way to support ART adherence and safer sex for PLWHA [people living with HIV/AIDS]. Use of tools such as PDAs among PLWHA in some resource-constrained settings may be acceptable and can build on existing use patterns.”

Reference sources:
- [http://colectapalm.org/](http://colectapalm.org/)
- [http://faculty.washington.edu/wcurioso/emulator/e/Poster_Colecta_Palm_07.pdf](http://faculty.washington.edu/wcurioso/emulator/e/Poster_Colecta_Palm_07.pdf)
Project 24: Mashavu: Networked Health Solutions for the Developing World

**Country:** Tanzania  
**Sponsoring Organization and Partners:** Pennsylvania State University and Ideablob.com  
**Application Area:** Remote Monitoring

Lack of sustained, regular care for children is often responsible for the spread of preventable diseases in the developing world. The ‘Mashavu: Networked Health Solutions for the Developing World’ project was initiated by students at Pennsylvania State University to tackle this challenge through mobile solutions. Mashavu (which means ‘chubby-cheeked’ in Swahili) is a computer-based system that enables doctors to connect with children in developing countries via mobile phones. Essential medical data (e.g., height, weight, blood pressure, and lung capacity) are collected at Mashavu stations in developing communities and sent by mobile phone to a remote server. Medical professionals can then ‘electronically adopt’ children by logging on to a web portal to monitor the children’s health, provide feedback or advice to the child’s caregivers, and collect health statistics. The student team from Pennsylvania State University is working with the Mount Meru Peak School and Good Hope orphanage in northern Tanzania to pilot test the system.

Reference sources:  
- http://live.psu.edu/story/29485  

Project 25: MediNet Healthcare Management System

**Country:** Trinidad and Tobago  
**Sponsoring Organization and Partners:** Microsoft Research and University of the West Indies  
**Application Area:** Remote Monitoring

The Caribbean is a region with very poor healthcare facilities, but a comparatively strong cellular phone infrastructure. Microsoft Research has provided a grant to professors at the University of the West Indies to create a mobile phone-based healthcare management system, to be deployed first in Trinidad and Tobago, followed by a broader regional rollout. The long-term goal is to build a network that integrates medical resources and promotes the sharing of medical information and expertise. The healthcare management system, ‘MediNet,’ will target diabetes and cardiovascular disease. The system is designed to relay information from patient monitoring devices to a central server via a cellular network. At the server, a data reasoning engine extracts all relevant information and alerts medical officers about severe cases. It also recommends appropriate responses such as a follow-up visit or phone call. The system can also send suggestions directly to patients via SMS message or pre-recorded voicemail.

Reference source:  
- http://research.microsoft.com/enus/um/redmond/about/collaboration/awards/cellphone-healthcare_awards.aspx#EAD
Project 26: Mobile Care, Support and Treatment Manager (MCST)

Country: India

Sponsoring Organization and Partners: ZMQ Software Systems

Application Area: Remote Monitoring

Keeping HIV/AIDS patients informed of their health status is one of the most basic ways of empowering them. With that in mind, the Mobile Care, Support and Treatment Manager (MCST) is being created by ZMQ Software Systems as an attempt to use technology to improve the logistical challenges of HIV/AIDS management in developing countries. The solution is conceived as a global model, but ZMQ admits that localization and adaptation to rural, urban, and peri-urban contexts will be a challenge. MCST will enable HIV/AIDS patients to use their mobile phones to access their lab tests and medical history reports. They can also use the system for nutritional planning, create alerts to remind them to take their medication, and connect with a help line. In addition, the solution can be used in ‘Group Management’ mode for organizations that work with HIV/AIDS patients. ZMQ is currently seeking partners for this project.

Reference sources:
http://www.freedomhivaids.in/mCST.htm
http://www.zmqsoft.com/

Project 27: Mobile Phones for Health Monitoring

Country: India and the United Kingdom

Sponsoring Organization and Partners: The UK – India Education and Research Initiative (UKIERI), Loughborough University, Indian Institute of Technology, All India Institute of Medical Sciences, Aligarh Muslim University and London’s Kingston University

Application Area: Remote Monitoring

Long considered a ‘rich country disease,’ diabetes is spreading rapidly in the developing world as affluence changes traditional dietary habits. In 2005, engineers at Loughborough University developed a mobile phone health monitoring system to monitor diabetes and other diseases. The system allows doctors to use mobile phone networks to monitor up to four key medical signals (electrocardiogram heart signal, blood pressure, levels of blood glucose, and oxygen saturation levels) from patients who are on the move. Engineers from the UK and India are working to ‘miniaturize the system’ so that sensors are small enough to be carried by patients while procuring the necessary biomedical data. In Britain, the solution will be used to improve healthcare delivery, while in India it will connect ‘centers of excellence’ to hospitals and clinics in more remote areas. Over the next three years, clinical trials will occur in both the United Kingdom and India.

Reference sources:

Project 28: Phoned Pill Reminders for TB Treatment

Country: Thailand

Sponsoring Organization and Partners: The Chiang Mai Public Health Department

Application Area: Remote Monitoring

The province of Chiang Mai in northern Thailand has a high number of patients with TB—a major cause of death in much of the developing world. A prime reason for high TB mortality rates is the failure of patients to take their medications on a regular basis. To combat this trend, the Chiang Mai Public Health Department piloted a program involving 60 TB patients who were provided with mobile phones that could only receive incoming calls. Patients then received daily reminder calls to take their medication. Dr. Surasing Visrutarana, Chief Provincial Health Officer, noted that during a three-month pilot in 2007 the drug-taking consistency rate for the patients was over 90%, a significantly higher rate of successful treatment than that observed in the province’s standard TB treatment program. The project was not only effective but inexpensive, with a cost of just 100 baht ($3) per person.

Reference sources:
http://listmanager.bps-lmit.com/read/messages?id=49295
Project 29: SIMpill Solution for TB

Country: South Africa

Sponsoring Organization and Partners: SIMpill and Tellumat

Application Area: Remote Monitoring

Reminders to take daily medication are an effective means to ensure drug regime adherence, which is critical for diseases like TB, where 99% of those infected can be cured with proper medication compliance. The SIMpill solution is designed to help ensure compliance. SIMpill works by equipping a pill bottle with a SIM card and transmitter. When the pill bottle is opened, an SMS message is sent to a designated healthcare worker. If the pill bottle is not opened when expected, the patient gets a text message reminder to take the medication. If the patient then fails to comply, the health worker is prompted to call or visit to encourage the taking of medication. A 2007 pilot in South Africa to test the system’s efficacy yielded impressive results. The pilot showed that with SIMpill, 90% of patients complied with their medication regime, compared to the typical 22 to 60% compliance rate without the system. The solution is now available worldwide.

Reference sources:
- http://free.financialmail.co.za/innovations/07/0302/minn.htm

Project 30: Virtual Health Pet

Country: Brazil

Sponsoring Organization and Partners: VIDATIS and the Atech Foundation

Application Area: Remote Monitoring

Virtual Health Pet has taken advantage of the popularity of the Japanese Tamagotchi virtual pets to improve medication compliance and patient health in Brazil. The virtual health pet, a J2ME software application running on the patient’s mobile phone and linked to an electronic health records system, interacts with the patient to remind them to take their medications on time and to monitor their overall health. Alerts are sent out to caregivers or emergency services if the patient does not respond to its pet’s messages in a timely manner. Because the software is linked to an electronic health records system, the Virtual Health Pet is able to both collect patient data and to provide the patient with near real-time information from their medical team. The Virtual Health Pet won a Special Jury Award at Simagine 2006, but it is uncertain whether the application is currently being deployed in the field.

Reference sources:
Communication and Training for Healthcare Workers

Project 31: Enhancing Nurses Access for Care Quality and Knowledge through Technology (ENACQKT)

Country: The Caribbean
Sponsoring Organization and Partners: The International Development Research Centre (IDRC) and the University of Saskatchewan
Application Area: Communication and Training for Health Care Workers

In order for health workers to provide effective patient care, access to timely information is essential. In the Caribbean, nurses often lack basic resources, work remotely, and are isolated, which makes data sharing challenging. Enhancing Nurses Access for Care Quality and Knowledge through Technology (ENACQKT) empowers nurses by providing training and other services via PDAs. A key component of ENACQKT is building nurses’ capacity through technology instruction, giving them the means to access healthcare applications through the PDAs provided by the program. This enhances professional development and improves quality of care for patients. Project principals report several achievements, including time savings for nurses and greater access to information, particularly in the areas of medication and treatment support. The project also reports success in imparting a sense of empowerment to the nurses in terms of speaking to physicians about conditions, treatments, and diagnosis.

Reference source:
Interview with Pammla Petrucka, Associate Professor with the College of Nursing, University of Saskatchewan

Project 32: HealthLine

Country: Pakistan
Sponsoring Organization and Partners: Microsoft Research, Carnegie Melon University (CMU), Aga Khan University (Karachi) and Health and Nutrition Development Society (HANDS)—a Pakistani NGO
Application Area: Communication and Training for Health Care Workers

One of the chief obstacles to mHealth solutions is literacy, or the lack thereof. To ensure that semi-literate community health workers have access to critical information, Microsoft and others are developing HealthLine, a speech recognition-based information system. The solution is based on Microsoft Speech Server2007 beta software. The menu-driven program can be accessed via landlines or mobile phones. Callers specify a topic (or disease) and are walked through a set of menus until they reach the information they are seeking. The information is then read to them—from a prerecorded message—in their local language. HealthLine was tested among a group of low-literate maternal and child health community health workers in Pakistan in mid-2007. It will continue to be tested in the field with the results informing new features, functionality, and enhancements. Ideally, the solution will be scaled across Pakistan for maximum impact.

Reference sources:
http://www.cs.cmu.edu/~healthline/flash/detail/
http://research.microsoft.com/enus/um/redmond/about/collaboration/awards/digitalinclusion_awards.aspx#Speech_Interfaces_for_Health_Information-Access
Project 33: Mobile HIV/AIDS Support

Country: Uganda

Sponsoring Organization and Partners: Trinity College Dublin

Application Area: Communication and Training for Health Care Workers

‘Training the trainers’—providing healthcare workers in the field with accessible and reliable medical information—is essential for improved health delivery in the developing world. Trinity College Dublin (TCD) is collaborating with the medical school at Makerere Hospital in Kampala, Uganda to explore the potential advantages of using PDAs in HIV/AIDS care and treatment. The project aims to provide high-quality medical information and advice to healthcare workers in Uganda and throughout sub-Saharan Africa. After an initial needs assessment, the project leaders—a group of academic clinicians from TCD, the Dublin Institute of Technology, and North American universities—developed a prototype of a training program on the clinical care, research, and prevention of HIV/AIDS. The program was to be evaluated by a select group of healthcare workers in the field. Results of the testing and evaluation have not yet been published.

Reference source:

Project 34: Primary Healthcare Nursing Promotion Program

Country: Guatemala

Sponsoring Organization and Partners: The National School for Nurses of Coban (Guatemala), Canadian Agency for International Development and the Centre for Nursing Studies (Newfoundland, Canada)

Application Area: Communication and Training for Health Care Workers

Nursing shortages, especially in rural areas, are common in developing countries (and increasingly in developed ones as well). The National School for Nurses of Coban in Guatemala created the Primary Healthcare Nursing Promotion Program to increase the number of nursing personnel available to work in rural areas. One component of this program is a virtual nursing course, which is taught via a combination of telephone and two-way data communications. Of the first virtual nursing course graduates in 2004, a subset became ‘community tele-facilitators.’ These tele-facilitators were each given a mobile (or satellite) phone, which they used to link their rural communities with health specialists in urban areas. The pilot test was launched in 2005 in five municipalities in northern Guatemala and covered 150 communities with a total population of 45,000. At this time, there appears to be continued progress on the virtual nursing training component, but it is not certain whether the tele-facilitator program continued after the initial pilot test.

Reference sources:
http://www.mspas.gob.gt/
http://www.enecav.edu.gt/
Project 35: The Uganda Health Information Network (UHIN)

Country: Uganda

Sponsoring Organization and Partners: Uganda Chartered HealthNet (UCH), AED-SATELLIFE, Makerere University Medical School, Connectivity Africa and the International Development Research Center (IDRC) of Canada

Application Area: Communication and Training for Health Care Workers

Uganda has become a laboratory for efforts to improve two-way data flows between health workers and government officials, and the Uganda Health Information Network (UHIN) is a prime example of these efforts. UHIN uses PDAs to collect data and to provide continuing medical education services to physicians. The PDAs send and receive messages via infrared beams that send the signals to battery-operated access points. The program was launched in 2003 and currently 350 PDAs are being used. They are connected to 20 access points in different districts of Uganda. Positive impacts were recorded early on: “The network delivered a 25% savings in the first 6 months...health workers using the handheld technology now have better job satisfaction and [it] is contributing to staff retention...” The UHIN is planning an analysis to determine if the project has had an impact on health outcomes such as healthcare planning, resource allocation, and delivery.

Reference sources:
http://pda.healthnet.org/
http://mobileactive.org/files/MobilizingSocialChange_full.pdf
Disease and Epidemic Outbreak Tracking

Project 36: The Acute Encephalitis Syndrome Surveillance Information System (AESSIMS)

Country: India

Sponsoring Organization and Partners: Voxiva, Program for Appropriate Technology in Health (PATH) and the Government of Andhra Pradesh

Application Area: Disease and Epidemic Outbreak Tracking

Every year, more than two million children die from preventable diseases in the developing world, and millions more are left impaired. One such culprit, Japanese Encephalitis, a devastating mosquito-borne illness, can be prevented by a vaccination, but it is not always administered due to its high cost and a lack of data on the disease’s true prevalence and impact. To begin to tackle this problem, the Government of Andhra Pradesh, where the disease is endemic, pilot tested an Acute Encephalitis Syndrome Surveillance Information Management System (AESSIMS) in one of its districts. Local health workers used mobile phones (or web-based technologies) to report incidences of the disease to the AESSIMS system. Decision makers could access and analyze this data in real time via a variety of tools, including GIS-based maps. It was envisioned that if the pilot test were a success, the AESSIMS system could be rolled out across India and into other Asian countries. There is no evidence yet, however, that this project was either scaled up or extended.

Reference sources:
Project 37: Alerta DISAMAR

Country: Peru

Sponsoring Organization and Partners: The US Navy, the Peruvian Navy and Voxiva

Application Area: Disease and Epidemic Outbreak Tracking

When disease outbreaks occur, timely transfer of information is of the essence. Alerta DISAMAR is a disease surveillance system, based on Voxiva technology, deployed by the Peruvian Navy with support from the US Navy. The system’s strength lies in its ‘multi-platform flexibility,’ which allows users to transmit or access data through multiple technologies, including mobile phones and the Internet. Alerts of disease outbreaks are also sent via multiple mechanisms (text messages, voice mail, and e-mail). An evaluation of the project conducted in 2003 found that within the first year of deployment, Alerta DISAMAR “rapidly improved disease reporting, allowed officials to obtain quality data in real time, and, most importantly, facilitated improved response to disease outbreaks in a remote region.” Since its launch, the system has reported more than 80,500 health events over a wide range of medical problems, including diphtheria, yellow fever, snake bites, diarrhea, and acute respiratory infections.

Reference sources:
- http://revision.dev.voxiva.net/news/121603.asp

Project 38: FrontlineSMS

Country: Worldwide

Sponsoring Organization and Partners: kiwanja.net, the MacArthur Foundation and the Open Society Institute

Application Area: Education and Awareness, Remote Data Collection, and Disease and Epidemic Outbreak Tracking

One of the largest and most ambitious mHealth programs in the world is FrontlineSMS. FrontlineSMS is a PC-based software application used for sending and receiving group SMS messages. It allows NGOs to run awareness-raising campaigns and competitions, and carry out text-based surveys, or to simply keep in touch with fieldworkers and supporters. FrontlineSMS gives access to ‘bulk’ SMS technology designed specifically with the NGO sector in mind. Although other bulk SMS systems do exist, almost all require reliable Internet connectivity—not an option in many developing countries. FrontlineSMS does not require an Internet connection and works with any GSM network. The software communicates via a mobile phone or modem, which can be attached to a computer with a USB cable. Users are encouraged to share views, experiences, and ideas in an online forum and to provide feedback for future versions of the product.

FrontlineSMS has been used for many healthcare campaigns worldwide including:

- **Africa-wide:** Reporting and monitoring avian flu outbreaks
- **Benin:** Sending health alerts to young people about HIV/AIDS, TB, and malaria
- **Botswana:** Coordinating a blood donation program
- **Ecuador:** Running surveys among rural healthcare workers and radio listeners
- **Malawi:** Coordinating healthcare workers and collecting data in the field
- **South Africa:** Providing HIV/AIDS information services to teachers
- **Tanzania:** Tracing patients who fail to keep clinic appointments and sending patient reminders
- **Uganda:** Aiding community-based healthcare in rural communities

Reference sources:
- http://www.frontlinesms.com/who/
- http://mobilesinmalawi.blogspot.com
**Project 39: GATHER**

**Country:** Uganda

**Sponsoring Organization and Partners:** Dimagi, Inc. (privately held software company), AED-SATELLIFE and the Rockefeller Foundation

**Application Area:** Disease and Epidemic Outbreak Tracking

Achieving data and device interoperability is one of the central challenges in improving data collection in developing countries. GATHER is a consortium that has developed a set of tools that enable data entry from a broad range of devices, including desktops, laptops, telephones, PDAs, GPS systems, and bar-code scanners. GATHER's first field test is currently taking place in Uganda with the collaboration of the Ugandan Ministry of Health. Weekly disease surveillance data for 20 health clinics is being collected by mobile phone and sent to a GATHER server located at the Health Ministry's Department of Epidemiology. The results of the Ugandan field test will inform future phases of GATHER development. The developers hope the technology will be ready for broader deployment by late 2009.

Reference sources:
- http://www.gatherdata.org/
- http://www.dimagi.com/content/gather.html

**Project 40: Handhelds for Health**

**Country:** India

**Sponsoring Organization and Partners:** St. John's Medical College (Bangalore), Indian Institute of Management (Bangalore) and Encore Software

**Application Area:** Disease and Epidemic Outbreak Tracking

Disease outbreaks often start in small clusters. Technology can play a crucial role in quickly detecting and containing initial outbreaks so that broader spread of communicable disease can be prevented. In India, Shashank Garg and Dr. Isha Garg have created Handhelds for Health, a social enterprise that is developing an open source disease surveillance system. With this system, health workers will be able to use mobile devices to collect, validate, and transmit data to a centralized server. The server will be accessible to resident experts, who can use the real-time data to rapidly identify disease trends and make informed public health decisions. Handhelds for Health will also be able to track non-communicable diseases, such as diabetes, that require continual medical attention and follow-up. The founders further hope to use the solution to collect and transmit the data required for large, community-based, longitudinal studies of diseases and other health issues.

Reference source:
- http://handheldsforhealth.org/

**Project 41: Remote Interaction, Consultation, and Epidemiology (RICE)**

**Country:** Vietnam

**Sponsoring Organization and Partners:** Microsoft Corporation, Thayer School of Engineering at Dartmouth College and the National Hospital of Pediatrics (Hanoi)

**Application Area:** Disease and Epidemic Outbreak Tracking

Rural locales in China and Southeast Asia have been identified as potential high-risk areas for SARS and avian influenza transmission. The Remote Interaction, Consultation, and Epidemiology (RICE) telemedicine system will include a disease tracking component to facilitate the early detection of such communicable diseases. Through mobile technology, RICE will also enable “remote medical consultation, epidemiological surveillance and access to medical knowledge in regions of the world without access to computers or the Internet.” Most of the interactions among the rural clinics, regional hospitals, and national hospitals will be conducted via smartphones. A pilot test of the RICE solution was conducted in March 2007 in Vietnam. Volunteers from Dartmouth tested the connection between clinics and hospitals in rural areas and the National Hospital of Pediatrics (NHP) in Hanoi. The researchers also investigated the information needs of rural clinics to inform continuing development of the solution.

Reference sources:
- http://dartmed.dartmouth.edu/summer07/pdf/vs_hanoi.pdf
Project 42: Tamil Nadu Health Watch

**Country:** India  
**Sponsoring Organization and Partners:** Voxiva  
**Application Area:** Disease and Epidemic Outbreak Tracking

Following the devastating 2004 tsunami, the US-based technology company Voxiva deployed a phone- and web-based data collection and disease surveillance system in India’s hard-hit Tamil Nadu state. The ‘Health Watch’ program, launched in May 2005, makes use of existing communications infrastructure (i.e., mobile phones, fixed-line phones, and the Internet) to allow health workers in remote areas to report disease incidence data to health officials in real time. The program also allows health professionals in distant medical centers to quickly analyze and share information and resources, and to adequately respond to specific health-related questions. For the Tamil Nadu project, over 300 primary health center doctors were trained by Voxiva. The interactive training sessions featured simple, easy-to-use bilingual manuals. Training was coordinated with local authorities so that disease surveillance and outbreak response protocols were promoted and reinforced.

Reference sources:
**Diagnostic and Treatment Support**

**Project 43: Cell Phone Applications for Clinical Diagnostic Therapeutic and Public Health Use by Front Line Healthcare Workers**

**Country:** Mozambique

**Sponsoring Organization and Partners:** Microsoft Research, Department of Information Systems and the University of Melbourne

**Application Area:** Diagnostic and Treatment Support

Despite being one of the world’s poorest countries, Mozambique has extensive cellular network coverage and a high percentage of health workers who own mobile phones. This project, supported by Microsoft Research, aims to take advantage of Mozambique’s ‘wired’ reality. The project principals, researchers from the University of Melbourne, have created a suite of applications that can run on standard mobile phones. The applications provide Mozambican health workers with diagnostic and analytical tools including reference material in the phone’s memory, a calculator for determining drug dosage, and a program for analyzing inputs from medical sensors (e.g., low-cost pulse oximeter probes or a simple electrocardiogram). The project runs from March 2008 to March 2009 and will conclude with an evaluation of the impact and efficacy of the applications suite.

Reference sources:
Project 44: Digital Inclusion Kit in Health and Higher Education

**Country:** Argentina

**Sponsoring Organization and Partners:** University of Buenos Aires, Fundapers (an Argentinean NGO) and the Microsoft Research Digital Inclusion Program

**Application Area:** Diagnostic Treatment and Support

Patients in marginalized areas in both urban and rural Argentina lack access to specialized medical centers, which are often the only sites where vital diagnostic tools are available. Researchers at the University of Buenos Aires are creating a Digital Inclusion Kit in Health and Higher Education (DIKHAE), which will allow smartphones to wirelessly connect to diagnostic tools like electrocardiograms, enabling sophisticated diagnoses to be conducted remotely. The test results can be stored on the smartphone until it is in range of a cellular signal, and then uploaded to a patient records system. A pilot conducted in 2006 received high marks from medical professionals for the system’s usability. Project sponsors also envision that the DIKHAE will be able to connect to X-ray, MRI, and other tools in the future.

Reference sources:

Project 45: Ericsson and Apollo Hospitals Initiative

**Country:** India

**Sponsoring Organization and Partners:** Ericsson and Apollo Telemedicine Networking Foundation (ATNF)

**Application Area:** Diagnostic and Treatment Support

In summer 2008, Ericsson and Apollo Telemedicine Networking Foundation (ATNF) signed a Memorandum of Understanding to “implement telemedicine applications over broadband-enabled mobile networks” in India. The initiative is anticipated to both decrease costs and improve health care outcomes, particularly for rural populations. The project specifics have not yet been announced, but mHealth will play a central role. According to the Chairman of Apollo Hospitals Group: “With the availability of wireless technology, mobile health will be integrated into the healthcare delivery system. The new mantra could well be ‘Healthcare for anyone, anywhere, anytime.’ ”

Reference source:

Project 46: HIV Mobile Decision Support

**Country:** South Africa

**Sponsoring Organization and Partners:** Dimagi, Inc. (privately held software company), D-Tree International, the Harvard School of Public Health and the Harvard University Program for AIDS (HUPA)

**Application Area:** Diagnostic and Treatment Support

Dimagi and its partners have been working since 2005 on a software program for handheld mobile devices that will help field health workers screen HIV/AIDS patients and determine their medical needs. Dimagi is partnering with the Harvard University Program for AIDS (HUPA) to develop the solution. A three-month pilot program was implemented in several hospitals in Tygerberg, South Africa. For this pilot, health workers were able to use any Windows Mobile 5 device, including most PDA’s and Windows Mobile-based smartphones. The software was designed to be sensitive to local needs, providing support in several local languages and a general user-friendly experience. Data were entered and stored in an embedded MySQL database, and then synchronized with a host computer via Internet or USB connection. Though this project focused on HIV/AIDS screening, the software and devices could be modified to assist with screening for other illnesses, or with triage and diagnosis.

Reference sources:
- http://www.dimagi.com/content/hiv-support.html
Project 47: M-DOK: Mobile Telehealth and Information Resource System for Community Health Workers

**Country:** Philippines

**Sponsoring Organization and Partners:** UN Development Programme (UNDP) and the Philippine Council for Health Research and Development (PCHRD)

**Application Area:** Diagnostic and Treatment Support

In the Philippines, like most island states, many remote communities do not have access to medical specialists. Technology may be limited in these areas and although basic mobile communication is common, data services such as Internet access may not be available. M-Dok was designed to allow rural community health workers to use simple SMS technology, with a specially designed graphical user interface, to send diagnosis and treatment information to specialists in urban areas. M-Dok requires a Java-enabled mobile phone with Adobe Acrobat Reader software. The project was given a one-year grant by the UNDP, and part of those funds will be used to develop a network of community health workers and referral physicians for the system.

Reference sources:
- http://www.apdip.net/resources/case/rnd54/view
**Project 48: Mobile E-IMCI**

**Country:** Tanzania

**Sponsoring Organization and Partners:** Dimagi, Inc. (privately held software company), D-Tree International, the Rockefeller Foundation, WHO and the Jerre D. Noe Professorship

**Application Area:** Diagnostic and Treatment Support

Often, health protocols are instituted but implementation falls short due to lack of resources in developing countries. D-Tree International, Dimagi, and other partners conducted a joint study that used PDAs to improve adherence to the Integrated Management of Childhood Illness (IMCI) protocols in rural Tanzania. The WHO and UNICEF developed the IMCI as part of their strategy of combating some of the most common diseases afflicting children in the developing world. While the IMCI has shown positive results in Tanzania, a lack of adequate supervision, insufficient training, and less-than-rigorous implementation have weakened its potential impact. The project’s research team attempted to address these problems by creating a program called e-IMCI, which runs on a PDA and guides health workers through the IMCI process with step-by-step instructions. The pilot results for e-IMCI were encouraging, suggesting that the technology employed is user-friendly enough for clinicians to use, and that both patient care and caregiver efficiency can be improved. Larger-scale and long-term studies are needed to bolster this argument, but early indicators are positive.

Reference sources:
- [http://www.dimagi.com/content/mobile-e-imci.html](http://www.dimagi.com/content/mobile-e-imci.html)

**Project 49: Mobile Telemedicine System**

**Country:** Indonesia

**Sponsoring Organization and Partners:** Institut Teknologi Bandung (ITB), the International Development Research Centre (IDRC) of Canada, the United Nations Development Programme’s Asia-Pacific Development Information Programme (UNDP-APDIP), Sukabumi Health Office, the Local Authority Development of Sukabumi and the Information and Communication Department of Sukabumi

**Application Area:** Diagnostic and Treatment Support

Providing adequate health services in all locales in Indonesia, like most island states, is extremely challenging. To overcome this challenge, a large number of technical and health-oriented organizations are collaborating on a prototype mobile telemedicine system. The system will enable remote consultation and diagnostics and also facilitate the collection of patient data. Depending on the communications infrastructure available at a specific location—radio, mobile, or landline phones, and the Internet—information will be shared between patients at ‘mobile telemedicine units’ and doctors at ‘medical service centers.’ As a first step, researchers conducted field surveys in West Java to inventory health and communications infrastructure. The results of these surveys informed the prototype development. Further enhancements to the system are being made and the team reports that “the project is challenging” as it integrates so many disciplines and technologies.

Reference sources:
Project 50: Nacer

**Country:** Peru

**Sponsoring Organization and Partners:** Voxiva, USAID-funded Pathfinder International program, Ministry of Health of Peru and Peru’s Regional Health Directorate of Ucayali

**Application Area:** Remote Data Collection, Remote Monitoring, Diagnostic and Treatment Support, and Disease and Epidemic Outbreak Tracking

Maternal and child mortality remains excessively high in most developing countries. Nacer was created to decrease by half the number of maternal and infant deaths in the Ucayali region in Peru. The Nacer solution allows remote healthcare workers to share data with other remote workers, medical experts, and hospitals, using any telephone (mobile, satellite, or fixed-line telephone systems—personal or public) or Internet technology. A centralized database hosts all of this data and allows for real-time access. Through Nacer, the entire health ecosystem can send and receive information in order to monitor patient health, provide referrals and follow-up care, and track supplies and disease outbreaks. Madhu Krishna of Voxiva claims that, “should health personnel report symptoms that are indicative of a serious, underlying health condition in a pregnant woman, regional health workers can review her records and send voicemail messages and other support to ensure the woman is receiving appropriate care.”

Reference sources:
- http://www.i4donline.net/articles/current-article.asp?articleid=350&typ=News

Project 51: TeleDoc – Jiva Healthcare Project

**Country:** India

**Sponsoring Organization and Partners:** The Soros Foundation and Jiva Institute

**Application Area:** Diagnostic and Treatment Support

A shortage of doctors spells inadequate treatment for many in the developing world, especially in remote rural areas. Connecting health workers in rural areas with doctors through mobile technology is a promising solution to this endemic problem. TeleDoc uses Java-enabled mobile phones to connect village-based healthcare workers with doctors in urban areas for remote diagnosis and treatment. Doctors receive real-time diagnostic information entered by the healthcare workers and prescribe appropriate treatments. TeleDoc field workers prepare any prescribed medicines at regional offices. These medications are delivered directly to the home of patients in rural areas by a combination of pharmacies and delivery personnel. In the spring of 2003, TeleDoc was tested in 15 villages in Haryana, India. The program won the World Summit Award for eHealth at the World Summit on the Information Society in Geneva in 2003, and has aggressive plans for expansion.

Reference source: