How Technical Innovation Can Improve Healthcare Access and Delivery:

Cases from South Africa and China

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ABSTRACT

Today, many resource-scarce countries labor to provide adequate healthcare to their citizens. The demands of an aging population and the global epidemic of chronic illnesses compound the problem. This paper provides current, real-world examples of health interventions using mobile broadband technology and the positive impact that these mobile health ("mHealth") solutions are having on the health and welfare of people in underserved parts of the world. This paper also discusses how the current global system of invention, intellectual property protection, and standardization make possible the rapid diffusion of mobile technologies and inspire mHealth solutions that are leading to healthier people and nations worldwide.

THE CHALLENGE

Today, many resource-scarce countries labor to provide adequate healthcare to their citizens. Difficulties include: significant physical distances between doctors and patients, particularly in remote and rural areas; too few skilled healthcare workers; and the high costs of healthcare equipment. The demands of an aging population and the global epidemic of chronic illnesses such as diabetes, heart disease and hypertension compound the problem. Innovative, efficient, technology interventions are needed to improve patient access to healthcare and to fight and prevent diseases.

According to the World Health Organization, developing countries face a health workforce crisis, with 57 countries in severe need of trained healthcare workers. Currently, just one percent of the world's population provides healthcare services to the more than 7 billion people on earth, most of whom live in developing countries. For example, Africa has 25 percent of the world's disease burden, but only 1.3 percent of the world's healthcare workers.[1]

The burden of chronic diseases is increasing globally. In 2001, chronic disease contributed approximately 60 percent of the 56.5 million total reported deaths in the world and approximately 46 percent of the global burden.[2] By 2020, chronic diseases are projected to account for nearly 75 percent of all deaths worldwide,[3] and the global burden of disease is expected to increase to 57 percent. Diabetes is particularly worrisome. An estimated 30 million people worldwide had diabetes in 1985. The latest estimate is 177 million, though the World Health Organization predicts the number of people with diabetes to rise to at least 300 million by 2025.[4] And, the International Diabetes Foundation estimate is even higher with 382 million people living with diabetes in 2013 and a projected 592 million by 2035.[5]

The cost of healthcare is a considerable problem for countries. In China alone, medical care accounted for 5.15 percent of Gross Domestic Product (GDP) in 2001. Annual health expenses rose from 0.98 trillion Chinese yuan (US$0.16 trillion) in 2006 to 2.4 trillion Chinese yuan (US$0.396 trillion) in 2011.[6]

Governments and public policy makers struggle to define and quickly respond to the health needs of their communities. For example, new and expanded efforts to reduce child and maternal mortality are underway in emerging countries. In many countries, the ability to assess the impact, accuracy and response to these efforts has been hampered by weak health systems and lack of available patient registration data which allows health providers to better track patients and history of care.

[1] **Global Health Workforce Crisis Key messages — 2013**
http://www.who.int/workforcealliance/media/KeyMessages_3GF.pdf
http://www.who.int/workforcealliance/knowledge/resources/GHWA-a_universal_truth_report.pdf?ua=1

Global Health Workforce Crisis
[2] http://www.who.int/nutrition/topics/2_background/en
[3] http://www.who.int/nutrition/topics/2_background/en
[4] http://www.who.int/mediacentre/factsheets/fs236/en
[5] http://www.idf.org/diabetesatlas
[6] mHealth in China and the United States: How Mobile Technology is Transforming Health care in the World's Two Largest Economies
http://www.brookings.edu/blogs/techtank/posts/2014/03/12-opportunities-mhealth-china-us-bleiberg

THE OPPORTUNITY AND SOLUTION

Technological interventions using ubiquitous mobile broadband — 3G, 4G and other advanced technologies[7] — are being tested globally and showing great promise. The technologies are connecting patients with their doctors and caregivers. And, by enabling real-time health monitoring and response, they're engaging patients in their own care and helping improve health outcomes. Program after program has shown that mobile broadband technologies can improve access to health services, enhance self-care, address rising health costs, increase productivity and respond to the increasing demands for care.

A recent study, authored by The Brookings Institution and the China Academy of Telecommunication Research, shows that mobile health ("mHealth") solutions can aid governments in providing health services to their citizens. When applied, mHealth can quickly and cost-effectively bring the benefits associated with access to health services and empower users to better manage their own wellness. The report describes a number of benefits that arise from the development and adoption of mHealth, including: improving access and affordability of healthcare by lowering disparities based on geography and income; helping those who live in rural areas to draw on the expertise of health providers living in urban areas; increasing administrative efficiency by reducing errors and streamlining medical processes; refining the patient experience by providing a means to deliver medical reminders and diagnostic information to patients and physicians; and encouraging better health data collection and analysis resulting in improved healthcare decision-making.[8]

There are an estimated 7 billion cellular connections worldwide as of March 2014 and this figure is expected to grow to approximately 8.7 billion by end of 2018.[9] This presents a tremendous opportunity for mobile technology to not just impact, but to truly transform health and wellness. Advanced mobile networks and devices offer solutions that have proven to be effective in overcoming many healthcare challenges. Today, mHealth solutions are bringing the latest medical intelligence to patients and sending patient medical data directly to care providers. They're efficiently and effectively extending the reach of doctors and enabling real-time contact between frontline health workers in remote locations and experts in urban facilities.

Activities in mHealth have grown in popularity worldwide. Approximately 247 million people have downloaded more than 97,000 types of mobile health applications,[10] and the mobile health market is projected to be worth between US$30 billion and US$60 billion by 2015.[11] The mHealth industry is projected to have US$305 billion in increased productivity gains over the next 10 years, and remote monitoring solutions could save US$200 billion over 25 years.[12]

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[7] http://www.itu.int/osg/spu/ni/3G/technology/index.html and
http://www.qualcomm.com/solutions/wireless-networks/technologies/3g-4g-roadmap
[8] http://www.brookings.edu/research/reports/2014/03/12-mhealth-china-united-states-mobile-technology-health-care
[9] GSMA Intelligence, April 2014; UN, April 2014
[10] research2guidance, Jan. '12/13
[11] A.T. Kearney, Mar. '13
[12] http://www.fiercemobilehealthcare.com/story/study-mhealth-productivity-gains-reap-305-billion-savings-over-10-years/2013-01-11

Many companies are developing technologies and products, and are engaged in standards-setting efforts to aid the emerging mHealth ecosystem. Their efforts lead to new wireless tools, devices, sensors, and services that inspire mHealth solutions. These solutions mimic the low cost structure of consumer electronic devices rather than the high cost structure of dedicated healthcare equipment. Mobile broadband networks are rapidly becoming a global platform, and increasingly low-cost mHealth devices provide a significant opportunity to make healthcare more accessible and affordable to people everywhere.

Ultimately, mobile broadband technology has many roles to play within the global health sector. Chronic diseases such as diabetes, hypertension and HIV/AIDS require constant management, and advanced mobile solutions have proven to be effective tools in this regard. The use of mobile technology also facilitates communication of local, regional and national health data, which allows public health policy makers to keep their finger on the pulse of the needs in their communities. In addition, health care providers working on the frontlines can benefit. Within the larger continuum of care, frontline health workers are often the first and only link to health care and preventative health services for millions of families in low- and middle-income countries.[13] However, there is a severe shortage of trained, frontline health workers to provide quality and timely healthcare services. Advanced wireless technologies, nearly ubiquitous worldwide, offer a revolutionary opportunity to strengthen the capacity of frontline health workers, expand coverage and improve the quality of healthcare delivery.

[13] http://www.mpoweringhealth.org/media/report_docs/139749687581929.pdf

CASE STUDIES FROM SOUTH AFRICA AND CHINA:

TANGIBLE EXAMPLES OF THE BENEFITS MOBILE TECHNOLOGY BRINGS TO GLOBAL HEALTHCARE

The increasing availability and capability of mobile technology is making an impact in many parts of the world. Below are examples of programs that are using existing advanced wireless technologies to increase the impact of frontline health workers and overcome access to healthcare challenges in order to improve people's lives.

South Africa: Mobile Health Information System

In South Africa, where access to relevant health literature and broadband Internet access is limited, nurses and doctors in the Eastern Cape Province now use 3G wireless technology to overcome access-to-information challenges and provide better care to their patients. With the help of the Mobile Health Information System (MHIS) program,[14] they can access pertinent healthcare data at the point of care.

The MHIS is built to operate on Internet-capable, commercially available, 3G-enabled smartphones and tablets. Health information and guidelines are pre-loaded onto these devices, which are also able to connect in real time to a reliable clinical library with updated and locally relevant information. Designed to support the delivery of comprehensive patient care, the mobile library serves the Eastern Cape Province of South Africa with a population of over 6 million.[15] The mobile library includes South African National and Eastern Cape Provincial digitized medical guidelines, protocols, diagnostic tools and drug formularies. In addition, new content can be downloaded from the Eastern Cape Department of Health mobile library portal directly to mobile devices on an as-needed basis.

The technical implementation of this program was overseen by Qualcomm Wireless Reach,[16] with the nonprofit FHI 360[17] leading the implementation. The implementation included the development of a mobile health library, a mobile health library portal and training for nurses and doctors on how to use the devices and information. In addition, South African mobile operator MTN provided discounted devices as well as discounted connectivity and technical support. The Eastern Cape Department of Health contributed the content that resides in the system. Nelson Mandela Metropolitan University, School of Clinical Care Sciences, conducted a needs assessment and a rigorous, multi-phased study of this program.

The study focused on the healthcare providers, nurses and doctors, within the larger continuum of care and found that both nurses and doctors actively used and responded positively to the MHIS tool. It also found that while the mobile library proved helpful to both groups, it had a larger impact on nurses — especially in rural, primary health community centers without doctors — who relied on its guidelines in caring for patients.

[14] http://www.qualcomm.com/media/documents/wireless-reach-case-study-south-africa-mobile-health-info-system-english
[15] Pretoria Statistics 2012, http://www.statssa.gov.za/Census2011/Products/Census_2011_Census_in_brief.pdf
[16] http://www.qualcomm.com/about/citizenship/wireless-reach
[17] http://www.fhi360.org

Among additional results of those surveyed:

- » Nurses and doctors overall reported enhanced clinical decision making and improved patient management.
- » 100 percent of nurses improved their management of patients' side effects from medications, resulting in a reduction of outpatient/clinic visits, hospital admissions and patient mortality.
- » The technology's impact on nurses was the most profound. With the MHIS tool, most nurses were more confident in answering questions at the point of care, thereby empowering their patients with information on their illnesses.
- » 100 percent of nurses reported making an accurate diagnosis and prescribing the correct treatment.
- » 96 percent of nurses reported prescribing the correct medication dosage.
- » 100 percent of nurses reported that the mobile library helped in updating their own knowledge on patient management, showing its value as an educational tool for continuing professional development in isolated rural health facilities.
- » 100 percent of nurses were able to provide correct health information to colleagues/peers upon request.

According to FHI 360, a projected 364,769 patients were served throughout the lifetime of the project via the 175 nurses and doctors who took part. In addition, over 150 hours of training was conducted for project participants which has led to an increase in overall learning.

Rochelle Gelandt, a registered nurse at Livingstone Hospital ARV Wellness Clinic, is responsible for the comprehensive care and management of HIV/AIDS-infected clients, including adults and children. These are her thoughts about how the mobile library has made and continues to make a positive difference for her and her patients:

"I love the fact that I could access health information at the point of care, as I do not always have the time to go the library. … I found the device most valuable when we did not have a doctor for months at a time in our clinic. As some of the clients also have other chronic conditions such as hypertension, diabetes and epilepsy, I used the device to check if prescribed chronic medication is not contra-indicated when using ARVs (antiretroviral drugs used in the treatment of HIV/AIDS). … I wish the device could be made available to every nurse and doctor as it would so much improve healthcare to our clients as well as make healthcare workers feel more appreciated and valuable."

Lulama Gqamana is a nurse in the Pediatrics ARV department who is responsible for the management of children on ARV therapy. Before participating in the program she was not computer literate. Her participation has given her the opportunity to learn about the neurological development of children whose mothers are HIV positive:

"Even if children are HIV negative, they (the children) are adversely affected because of the direct effect of the HIV virus on the central nervous system. The virus can affect their development academically according to the studies that have been conducted. This (information) has made me understand why ARV therapy should be started early on children. All this information has helped me to know how to advise parents and caregivers when they (the children) have problems at school."

China: Mobile Vision Project

The Mobile Vision healthcare program[18] began in October 2011 in rural China's Hebei Province with the aim to help prevent lifelong vision disabilities. This project utilizes a 3G-enabled mobile application, smartphones and 3G wireless connectivity to assist doctors in the collection and archiving of information related to the screening and treatment of children with amblyopia.

According to the National Eye Institute at the United States National Institutes of Health, amblyopia, or "lazy eye," is the most common vision impairment in children globally. It can lead to permanent eyesight problems if left undiagnosed.

The Mobile Vision Project addresses two key issues: a lack of local knowledge about how to properly diagnose and treat amblyopia; and financial constraints, which often prevent many children in remote areas from receiving adequate treatment for this disease. By leveraging the power of mobile broadband, this project enables local healthcare workers to access medical knowledge and patient records anywhere, at any time. Having this information allows them to screen and treat children with amblyopia more effectively. It also helps them educate communities about this and other common eye diseases.

The mHealth solution includes several key components: a custom mobile application that enables data collection and analysis and helps with patient screening and diagnosis; an electronic medical record that allows designated healthcare workers to locate and receive a patient's medical chart via mobile device or computer; and a searchable, online ophthalmology databank containing a comprehensive collection of the latest eye care information.

Eye care professionals at Hengshui City Maternal and Child Care Service Center (MCCSC) and other public health centers received 3G-enabled smartphones pre-loaded with the custom mobile application as well as laptop computers, PCs and 3G connectivity. Having these tools allows them to access the electronic medical record 24/7, regardless of their location. Clinicians can also access information and materials in the databank to improve their knowledge of amblyopia and other common eye diseases, enabling them to provide better and timelier care.

Doctors in remote villages access the system via web portal or mobile application to record basic data and submit reports to county-level MCCSCs. County health workers electronically review patients' health records and then refer children needing further treatment to city-level, public health centers. City-level health workers access the system to obtain clear information on how to treat patients. Collectively, the project serves approximately 400,000 children and teenagers up to age 14.

[18] http://www.google.com/
url?sa=t&rct=j&q=&esrc=s&frm=1&source=web&cd=1&cad=rja&uact=8&ved=0CFYQFjAA&url=http%3A%2F%2Fwww.
qualcomm.com%2Fmedia%2Fdocuments%2Ffiles%2Fwireless-reach-case-study-china-mobile-vision-project-english-.
pdf&ei=8ixGU4OnD6ukyAGgpIDYBA&usg=AFQjCNFZy0gKFKxzZJsz2LYBmtjApgqG9w

Program partners worked closely together, each providing technical advice, support, training and funding. Xi'an Kingtone Information Technology Co., Ltd. is an application developer and provider of information management technology, including 3G-enabled solutions. In this program, the company developed the mobile application that is being used. Kingtone also oversaw the project's implementation, alongside wireless operator China Telecom, which provided 3G connectivity. Other project collaborators included the China Children and Teenagers' Fund which, through its specialized institution focusing on children with amblyopia, supported program site selection, and coordinated with the Hengshui Women's Federation, local health bureaus and ophthalmology experts who provided doctors with training.

One year after it was implemented, the Mobile Vision Project showed great promise:

» 50 township-level clinics regularly used the system in their daily medical practice and an additional 71 clinics had registered to roll out the system.

» Of the 1,144 eye exams collected, 684 patients have been identified as having suspected cases of amblyopia.

Data collected in October 2013 demonstrates this mobile technology project's growing impact on communities:

» 101 township-level clinics regularly use the system in their daily medical practice.

» Of 23,286 eye exams collected to date, 3,073 patients have been identified as having suspected cases of amblyopia.

The most compelling assessment of the project's impact comes from those who implemented the program.

Yanmin Zheng is the Vice President for the Hengshui Women's Federation in Heibei Province and remarked, "This project began running in Hengshui City. Some of the hospitals may have computers and Internet access, but may not have access to the Ophthalmology hospital, not to mention health centers in rural areas. With a 3G-enabled phone, a clinician can now use the Internet to learn more about ophthalmology and communicate with experts online."

Doctors involved in the program have also seen the benefit of this program. Qingye Shu, a clinician at Damasen Public Health Center observed that participation in the program: "improves our diagnosis and treatment techniques." In addition, Ophthalmologist, Kefang Li of the Hengshui Second People's Hospital in Heibei Province, commented on the benefit of anywhere anytime access saying that "after encountering a child with amblyopia, we can now immediately enter the data via our mobile phones, and we reference the record at any time in follow-up treatments."

A Continuous Cycle of Innovation

The above programs were developed and executed under Qualcomm Wireless Reach, the main objective of which is to spur the innovative use and adoption of wireless technologies and solutions in key international and domestic markets. Wireless Reach programs are based on several factors, including a community's information and communications technology (ICT), education and/or healthcare needs and goals; the availability of wireless coverage in the community; the ability of the local wireless operator to provide wireless solutions; and strong relationships with local non-governmental organizations.

A continuous cycle of technological innovation makes these transformative programs in South Africa and China possible. The technologies, devices and capabilities of the devices result from the work of innovative engineers and companies throughout the world. These individuals and organizations work collaboratively on the technical standards that help create agreement around the best technological solutions and create the basis for high-quality devices and mobile networks. Their ideas and creativity result in solutions that are quickly adopted and work across many technologies, multiple platforms and geographies — including the products and services that make possible the access to life-changing health information that enables health workers to aid patients.

Many of these companies make considerable investments in research and development (R&D), which benefits innovation. Qualcomm, for example, invests more than 20 percent of its annual revenue in R&D. The technologies that come from that commitment to R&D aid programs like Wireless Reach and its project collaborators in bringing solutions to underserved communities globally.

REQUIREMENTS:

STIMULATING TECHNOLOGICAL ADVANCEMENTS
TO IMPROVE HEALTH

Many factors are needed to ensure the continuation of mHealth innovations and technology diffusion. In examining the steps to implementing mHealth programs in South Africa and China, the availability and access to wireless technology — including infrastructure, devices and content — was crucial. Without the existence of compatible and available devices and expert mobile operators and content developers, these programs would not have been possible.

Effective Incentives for R&D Investments

The previously discussed Mobile Vision Project and Mobile Health Information System are based both on standardized and non-standardized technologies, for which many of the features are covered by patents. Indeed, the mobile devices that healthcare workers in South Africa and China use every day include thousands of inventions. This frequent daily usage and general, ubiquitous availability that, according to the World Economic Forum, includes more than 6 billion connections worldwide with US$1.3 trillion in annual revenue, makes mobile telephony the largest information and communication technology in history.[19] It is, as a result, driving economic growth and important societal benefits.

The life-changing impact of mobile devices owes much to the ability of the people who invented them to obtain intellectual property protection, primarily in the form of a patent. A patent protects an invention for its owner by preserving the exclusive legal right of the owner to make, use and sell the invention. This enables patent holders, typically through the licensing of the patent, to receive a fair return on their R&D investment and motivates them to continue to reinvest in improving upon the patented inventions.

Overall, mHealth opportunities would not be possible without the enormous growth and advancement of wireless technology. Advances in mHealth are a direct result of innovations in chip design, improved processing power, antenna enhancements, improved battery life and faster networks — the same networks that enable Internet browsing and wireless delivery of new services.

Governments have an important role in supporting invention. They often are crucial to providing the incentives that are needed to stimulate new ideas, inventions and products: an ongoing commitment to funding basic research; a strong patent system that ensures ideas are protected and rewards invention; and dedicated and constant investment in the education of its citizens. An effective patent system is a critical component of the Information Age, which has been flourishing for over half a century. It is vital to ensuring access to the latest inventions that drive economic development, job growth and overall quality of life throughout the world.

[19] World Economic Forum, The Global Information Technology Report 2012. http://reports.weforum.org/global-information-technology-2012/#=

Commitment to Strong Intellectual Property Rights is the Foundation for Innovations to be Shared Globally

Recognizing the importance of the inventor is vital and well understood by companies contributing to the mobile and mHealth industries. Qualcomm Incorporated is one such company — a leader in 3G, 4G and next-generation wireless technologies whose ideas and inventions have driven the evolution of wireless communications. As a technology developer, Qualcomm relies on advances derived through research and development, strong intellectual property protections and patent systems that promote innovation and reward companies that invest in new inventions.[20]

Advancements in technology often require significant R&D investments. Strong patent rights are necessary to drive the large and often risky investments in mobile technologies that inventors and the companies that commercialize those inventions make in order for the industry to expand and thrive.

In the wireless industry in particular, protecting intellectual property is the first and foremost step in assuring inventors of the security of their labors and, in turn, encouraging the development of new technologies and applications. The importance and success of identifying and securing intellectual property is clear. Rapid advances in mobile technology and mobile services are delivering benefits to consumers worldwide that were unimaginable just a few years ago. These advances are enabled through a robust and expanding intellectual property system.[21]

Investments in Mobile Infrastructure

Commitments from governments to diffuse wireless technology and build mobile infrastructure are also important. As mobile devices continue their rapid global spread, one of the most pressing issues today is building the infrastructure that enables expanded capability and services. This includes expanding high-speed mobile networks to improve access by underserved populations and encourage an environment that supports invention and creativity through improved communications. Fast mobile networks are crucial for the utilization and success of mHealth solutions. With mobile traffic rising rapidly, it is vital that governments aid inventors who are working to create new devices and services, and building out networks to support this new world order.

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[20] Founded in 1985 by seven people in San Diego, California, Qualcomm began without a specific product in mind, but with the determination to innovate in digital and wireless communications. That innovation came in the form of a mobile technology called Code Division Multiple Access (CDMA) that, at the time, was widely perceived as promising, but laden with risk for potential industry partners. By licensing its growing portfolio of patents to cellular phone and equipment manufacturers, Qualcomm was able to increase the capabilities of CDMA technology and fund its commercialization.

[21] In April 2011, Qualcomm filed the 2 millionth international patent application under the WIPO PCT, a mechanism that makes it easier for companies and inventors to seek patent rights in the 142 countries bound by the Treaty. The PCT consolidates and streamlines patenting procedures, postponing the payment of sizeable costs and providing applicants with a sound basis for important decision-making. Qualcomm has been using the PCT system since 1988 and has since filed nearly 9,000 PCT applications — making it one of the PCT's most active users.
[Source: WIPO magazine (2011) http://www.wipo.int/wipo_magazine/en/2011/03/article_0004.html]

Investing in mobile infrastructure and encouraging mobile usage ties directly to economic growth. For example, an analysis by economists Harald Gruber and Pantelis Koutroumpis found that national growth improves significantly based on mobile usage. Looking at 192 nations from 1990 to 2007, they found increasing returns in terms of productivity and growth based on the use of mobile devices. Mobile technology added 0.20 percent annually to gross domestic product (GDP) in high income countries and 0.11 percent in low income countries. They also looked at mobile infrastructure investment and found that it had a positive impact on economic growth. Nations that invested in mobile infrastructure saw GDP gains of 0.39 percent in high income places and 0.19 percent among low income places.[22] These findings clearly demonstrate the value of the mobile economy.

Successful Diffusion of Mobile Technology Through the Adoption of Standards and Licensed Inventions

Standardization and standards are a means to disseminate the results of research and innovation, including intellectual property rights, towards marketable product and process innovation activities. The standardization of technology and the corresponding intellectual property policies of standards development organizations, ensure the availability of patent licenses for inventions that are embodied in the standardized technology. And this, facilitates the dissemination of the results of expensive and high risk R&D — through incorporation of R&D into standards-compliant products that are widely distributed in the marketplace. This process is critical to ensuring that new wireless technology solutions are used as widely as possible. Estimates by the Organization for Economic Co-operation and Development (OECD) and the US Department of Commerce both show that standards and related conformity assessment (checking that products and services measure up to standards) have a positive impact on 80 percent of the world's trade in commodities.[23]

Global standards in the wireless industry aid in building consensus around the best ideas and make it possible for mobile networks and devices to operate across a multitude of platforms and geographic areas. Standards provide companies and inventors with a common basis for commercializing products and allow the industry to grow with the licensing of patented technologies contained in the standards.[24] In order to enable the creation of standards that include state-of-the-art technologies and that have the prospect of being used in the marketplace, it is in the interest of the different stakeholders that patent matters are properly addressed during the standard-setting process, and that patent holders not be constrained in their ability to enforce their patents that read on industry standards.

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[22] http://dev3.cepr.org/meets/wkcn/9/979/papers/Gruber_Koutroumpis.pdf

[23] More on the benefits of standards can be found in the brochure from the International Standard Organization at http://www.iso.org/iso/bottom_line.pdf

[24] Companies such as IBM and Qualcomm implemented the practice of licensing intellectual property, a practice that many others within the wireless industry have replicated. Recognizing the value of intellectual property, companies throughout the industry have received licenses to use patented inventions and contribute to the global mobile ecosystem.

CONCLUSION

The rapid diffusion of the mobile technologies used in mHealth solutions is made possible by the current global system of invention and intellectual property protection. Supported by this system, industry leaders clearly see that wireless access will continue to grow and expand. They see mobile devices becoming more capable and affordable while also enabling access to a widening array of resources.

As the projects in South Africa and China show, the most advanced mobile technologies greatly improve the day-to-day lives of people with healthcare needs. It is very possible that one day many more people will have access to better life-enhancing services through wireless technologies.

Development practitioners, public agencies and members of private industry need to understand how technology is created, valued and disseminated to emerging parts of the world. No one, not even its inventors, could have predicted the explosive and global impact of mobile technology. Within an environment that encouraged invention and assured the ability to realize the benefit of those inventions, the mobile industry has been able to innovate and inspire solutions that are leading to healthier people and nations worldwide.