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DEVELOPMENT FORUM

MOBILE FOR DEVELOPMENT:

TRANSFORMING GLOBAL HEALTHCARE
THROUGH MOBILE TECHNOLOGY

PART TWO

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INCLUSION, EXPANSION AND THE FUTURE OF MOBILE HEALTH

Technology and the data it collects are increasingly seen as a gateway to solving some of the most challenging sustainability issues in the developing world. The Sustainable Development Goals (aka The Global Goals) are focused on finding innovative ways to overcome some of the most complex development issues today. Access to affordable health is no exception. The right to health, cemented as Global Goal 3, is especially challenging to achieve in remote and resource-poor communities. Technology breaks geographical barriers that isolate many excluded groups, especially women, children, elderly and disabled, to ensure they can access quality healthcare available in the cities. The right to health will be increasingly realised through technology creating new opportunities in healthcare.

There is a debate on practical sustainability of mHealth in the developing world. This report, as part of AIDF's Mobile for Development series, highlights the importance of integrating mHealth solutions into sustainable business models provided by the mobile money sector as part of the wider issue of inclusion. Expanding on integration, the report argues the need to annex mHealth with eHealth services to form a mobile-digital ecosystem, which in turn will facilitate an additional resource for national health systems, that of big data. The need to clarify and address security and protection issues in mHealth is spotlighted as a growing matter for governments. In taking mHealth forward to the next level of connectivity and innovation, particular focus is paid to its expansion and sustainability in the developing world and what this means in overcoming current challenges impeding its acceptance or adoption.

Furthermore Global Goal 17 on partnerships for sustainable development underpins the inclusive and scalable growth of mHealth solutions. Governments, community-based organisations, patients and doctors must lead in deciding, framing and introducing the most context-appropriate mHealth solutions to meet the needs in developing countries. In the spirit of the Global Goals, this encourages a stronger commitment to "leave no one behind" and ensures all people have a legitimate stake in creating a more inclusive and progressive future.



HEALTH INCLUSION THROUGH MOBILE MONEY

The rate of mobile phone adoption has accelerated and reaches over 1.7 billion people, outpacing the number of people who have access to clean water, electricity, or basic healthcare services. Finding ways to create and scale financial inclusion in emerging and developing countries for positive socio-economic change is imperative to equalising development with the pace of technology. Providing affordable and sustainable solutions has been challenging because the rate of network coverage has overtaken the underlying need for developing sustainable business models to maintain mobile communication growth. Ensuring healthcare services are convenient and seamless requires connecting mHealth with digital or mobile methods of payment.

mHealth Alliance's 'Sustainable Financing for Mobile Health' report emphasises how this fragmentation is impeding the scaling up mHealth innovations and its benefit in low and middle-income countries. The problem often lies with reliance on short-term grant funding from governments, foundations or the private sector, this often results in uneven design and delivery in mHealth solutions.

Through innovative programming, mobile money can enhance transparency, efficiency, and security of financial transactions within the health sector. "Mobile money" consists of "*financial transactions that are conducted using a mobile phone, where value is stored virtually (e-money) in an account associated with a SIM card. Individuals can deposit cash onto a mobile account, make transactions between accounts, and withdraw funds as cash. Mobile money transactions are compatible with basic phones and do not require Internet access*" (USAID's Health Finance and Governance, 2013.)

Efficiency, security, and transparency that mobile payment solutions

Benefits of mobile money for health

- Facilitates person-to-person transfers at scale, such as conditional cash transfer programs for dispersed populations to increase use of service.
- Enables collection of funds from hard- to-reach locations, such as routine small payments for health insurance premiums.
- Increases safety of health workforce by reducing need for cash transactions at clinics.
- Allows for targeted and timely assistance in emergencies, such as taxi payments in the event of obstructed births.
- Protects against catastrophic financial setbacks by offering enabling earmarked savings for health emergencies.
- Provides permanent real-time records for bulk payments such as per diems or salaries.

(USAID's Health Finance and Governance, 2013)

Mobile money has the potential to accelerate commercial activity and attract private sector investment. This is demonstrated by the rapid growth in mobile money services throughout sub-Saharan Africa. Mobile operators charge small transaction fees for transmitting and withdrawing funds from mobile money accounts. Since mobile

money services provide higher likelihood of profitability rather than health information services, mobile operators are more likely to subsidise health information services that increase the use of mobile money.

The Mama Rescue programme in Uganda uses eVouchers and mobile money to link up emergency transport services for women in labour. The results show that it is more cost effective than paper based systems, with much lower risks of corruption and a fraction of overheads.

MicroEnsure has introduced a mobile-based health insurance product where subscribers can register via their mobile phones. The users then pay a premium and are able to receive claims through their mobile money accounts. The mobile phone operator Tigo provides free insurance premiums to its high-use network customers, thus generating significant demand for the insurance products. Those rewards provide mutual benefits to the operator as the rewards build customer loyalty among the most valued customers and generate additional network use with the additional mobile insurance transactions, thus covering the costs of the free subsidies.



ICT (Information and communication technology) is increasingly being connected with innovative delivery services, ensuring mobile methods and local resources work hand-in-hand. Furthermore this connection enables a wide network of health clinics and community health workers (CHWs) to be linked through their technology and health insurance scheme. For instance, the Djantoli organisation assists children and mothers in Mali and Burkina Faso by providing health monitoring, health insurance, and preventative education services all of which are delivered by mobile phone-equipped community agents. This way the communities are linked to local doctors

who provide remote monitoring and disease detection. From 2010 to present, Djantoli has successfully treated 3500 children, providing them with home visits, mobile monitoring, and health education talks.

USAID's Health Finance and Governance (2013) states that mobile money offers new opportunities for sustaining mHealth applications, which at present are predominantly dependent on donor funding. Integrating mobile money and mHealth programs offers opportunities to generate new sources of revenue and to attract additional financing partners. In one innovative partnership, Tanzania mobile operator Tigo and micro-insurance provider MicroEnsure teamed up to provide a mobile phone-based insurance product called KiiRay. Tigo provided free insurance premiums to its high-use network customers, thereby generating significant demand for the insurance products. It has been demonstrated that mobile financial products for health provide strong incentives for mobile network operators to use their vast marketing resources to promote service uptake – including building customer loyalty and generating network use.

In remote locations patients from low income households are looking to include micro-insurance into their healthcare plans. Patients can pay for micro-insurance premiums through their mobile phones and receive claims into their mobile financial services account. Presently over 35 million low-income households in Kenya can not get quality healthcare because they are unable to pay for medical treatment or conventional health insurance. The Linda Jamii insurance plan enables people to meet the cost of health insurance by making payments in manageable instalments using M-PESA (mobile phone-based money transfer). Furthermore this insurance plan provides cover for maternity care, dental work, eye tests treatment of illnesses related to HIV as well as other pre-existing conditions.



Mobile money can assist poorer people, who cannot afford transport costs, to receive specialist clinical care. Even in developing countries where healthcare is free, lack of or inability to pay for transport severely constrains effective diagnosis and treatment. Recognising these challenges, CCBRT (Comprehensive Community Based Rehabilitation in Tanzania), the largest provider of obstetric fistula treatment, has been able to reach fistula patients in need through M-PESA money transfer. The programme works by opening the lines of communication between a network of ambassadors and the fistula patients. On behalf of the patient CCBRT transfers a request for funds to the ambassador through M-PESA, who then purchases a bus ticket for the patient to attend a health check appointment. By assisting the programme and encouraging referrals the ambassador receives additional funds to support their work. As a result, mobile money has broadened the reach of CCBRT to all regions in Tanzania, overcoming practical barriers to healthcare.

Therefore, in order for the private sector to become more involved, mHealth focus should be given to sustainable business models like those supporting mobile money.

Seven success factors for creating financial sustainability

1. Know the stakeholders

- i.** Organisation size: Bigger organisations are more often engaged when implementations show cost advantages.
- ii.** Sector membership: Companies will be more attracted to mHealth value chains that demonstrate scalable sales or revenues. Additionally non-profit organisations will be looking for mHealth innovations that align with their mission.
- iii.** International vs. local: Local organisations, being more in-tune with local conditions and needs, are more inclined to adapt a model appropriate for their environment. International organisations can provide technical assistance such as software development, that are not location-specific.
- iv.** Repeat vs new customer: New customers will want to see business cases or estimated outcomes to incentivise initial investment. Repeat customers will want evidence of demonstrated returns to retain investment.
- v.** Short-vs. long-term horizon: Organisations that operate on short-term-to-return, such as the for-profit sector, will more likely participate when mHealth solutions have reached scale. Organisations that operate on longer time horizons, such as donors, are more able to participate in early or start-up stages when return may take several years.

2. Ensure the value proposition for all stakeholders: Engaging each player in the value chain will depend on understanding the incentive that drives their participation. Key players to bring on board are governments and Mobile Network Operators (MNOs).

3. Plan for a long-term economic buyer: Sustainability will rely on forecasting where funding is coming from, early on and long term in the mHealth solution lifespan.

4. Localise the business model: Organisations have to make sure their business models are appropriate for the environment, specific players and context. Value-chain players and assets will need to be in place when

adapting specific mHealth business model in another country.

- 5. Plan for capacity building, including monitoring and evaluation (M&E):** Ensuring there is scope of capacity building will help plug gaps in financial, human and other resources in mHealth. M&E is an important tool for this.
- 6. Keep it simple:** Simpler value chain models are more likely to succeed. In cases where there are multiple players, conflict or interest can be avoided by keeping contributions within core competencies.
- 7. Understand the particular finding needs of mHealth application types:** mHealth applications will have varying needs for funding depending on the type of application and the evolutionary stage of the intervention.

(mHealth Alliance and Vital Wave Consulting (2013))

As well as assisting patients, the use of mobile money has also benefited doctors and nurses. At present, because mHealth apps are not sufficiently integrated into either public or private insurance plans many doctors fail to be reimbursed for their e-mail, phone and text message consultations. Additional doctorial roles such as data collected through remote monitoring devices are also not reimbursed. At present, reimbursement policies are largely devised around in-person medical treatment, disregarding the tendency of consultations towards the digital and mobile platforms. As a result, this creates a major disincentive for doctors to build interest and reliance on technological avenues that can facilitate easier workflow and ultimately scales back the advantages of the mHealth sector. To overcome this, new policy changes must recognise transformed medical landscape in favour of mobile and digital technology which has benefited doctors and patients in delivery and reception of healthcare.

Clarifying rules and regulations would improve adoption of mHealth practices. It also would be useful to clarify policies on adoption and reimbursement (West, 2012). Therefore, since government is the primary driver behind molding the direction of the health care systems, technology companies must remain closely attuned to the evolving legislative and regulatory climate. Health officials should regulate patient consultations through mobile devices and reimbursement practices of physicians who deal with patients through video chats or remote monitoring devices. Removing these barriers would encourage health professionals to make use of newly-emerging ways to diagnose and treat patients. Encouraging greater cooperation among network operators, equipment manufacturers, and health care professionals would encourage the adoption of mHealth. By improving discussions across these groups, it would be easier to innovate and speed up the growth of the mHealth market.

In 2010, Marie Stopes Madagascar (MSM) introduced SMS money transfer to enhance reimbursement of sexual and reproductive health services in remote, rural and urban settings. SMS money transfer helps replace costly cash payments that involve considerable travel cost and risk of fraud to MSM staff. MSM's online database also improves the tracking of vouchers, monitors the performance of Community Health Workers and helps to analyse the participation of social enterprises in its voucher programmes. MSM now uses money transfer systems provided by Orange, Airtel and Telma.

SMS money transfer systems can significantly strengthen the reach, efficiency and sustainability of health's services for poor people and help meet national maternal health targets.

In Kenya, Safaricom is assisting people to budget for health care costs through its electronic payment system M-PESA. The success and widespread availability of M-PESA makes it easy for users to save money for medical expenses. To this end, Safaricom linked up with Changamka, the Kenyan medical insurance provider. By combining their expertise, and working alongside health-care providers equipped to use the M-PESA system, the two companies are helping poor people meet the costs of health care. M-PESA's success is due to continuous customer education, 24-7 customer support, brand trust, robust agent network, continuous product innovation (value-added services, rewarding customer loyalty) and an enabling regulatory environment.

A major barrier preventing the mobile money uptake is the lack of a well-trained agent network to serve and address the financial needs of the community. This is significantly evidenced in remote areas. Synergies are being made between CHWs (Community Health Workers) and mobile money agents, thereby leveraging the trust they have built in communities as frontline workers. Training CHWs to serve as "last mile" mobile money agents in hard-to-reach areas can help extend the spread of both health services and mobile money as combined services. CHWs who are trained as mobile money agents are well positioned to educate clients about the benefits of expanded access to financial services, including paying for emergency transportation to health services or signing up for insurance.

CONNECTED HEALTH: INTEGRATION OF mHEALTH WITH eHEALTH ECOSYSTEM

The uptake of mHealth initiatives will heavily depend on better integration between information technology (IT) and the mHealth platforms. The lack of interoperability between technologies remains a key challenge towards greater acceptance and dissemination of mHealth innovations. eHealth covers all ICT-enabled health services and devices that are used by health professionals, carers, funders and patients. mHealth devices are increasingly connected as other digital health platforms, often seen as an extended branch to eHealth programmes.

SOS Children's Villages and Safe Triange Ltd use Immarsat's BGAN Link to ensure remote communities in Benin have access to healthcare through remote monitoring. Safe Triage enables remote medical teams to capture and share relevant patient medical information in real-time with relieving hospitals where specialists are able to access and advise appropriate interventions. Clinics use Safe Triage telemedicine applications to gather patient's medical information on smart tablets. Since Immarsat's global 3G satellite network delivers 99.9 percent availability over its satellite and ground network, voice and broadband connectivity can be provided even in the remote areas. The initiative enabled early identification and treatment prioritisation of patients with potentially life-threatening diseases. The programme identified 70 individuals with serious health conditions that required immediate treatment and also allowed them access to medical care .



Interoperability is vital to digital responses in public health crises. mHero enables real-time monitoring, complex surveys, and detailed analysis of health events. mHero supports interoperability between human resource information systems, UNICEF's RapidPro messaging system, and uses an OpenHIE architecture, all of which enable sharing of health information. It is also compatible with DHIS 2, the preferred information management system of many governments. mHero's messaging system is effective in an organised international response to disease outbreaks, as health workers often speak different languages and have varying levels of education. mHero's messages can be set up with users' language preference and reading ability, and includes picture-based references.

mHero takes advantage of several interoperable open source technologies, including:

- IntraHealth's iHRIS software, which is used by 19 countries to track human resources data on their health workforces
- UNICEF's SMS platform, a toolset for rapidly building text message services for data collection and group coordination
- OpenHIE, a global initiative that works to improve health in underserved populations by supporting country-driven, large-scale information sharing architectures
- DHIS 2, a web-based information system that helps governments and health facilities manage their operations, monitor processes and improve communication
- mHero gives health workers the benefit of reliable information from an official source, which can assist them in working safely and effectively. And health workers can use the information to debunk false rumors about Ebola that are now rampant among the West African public.

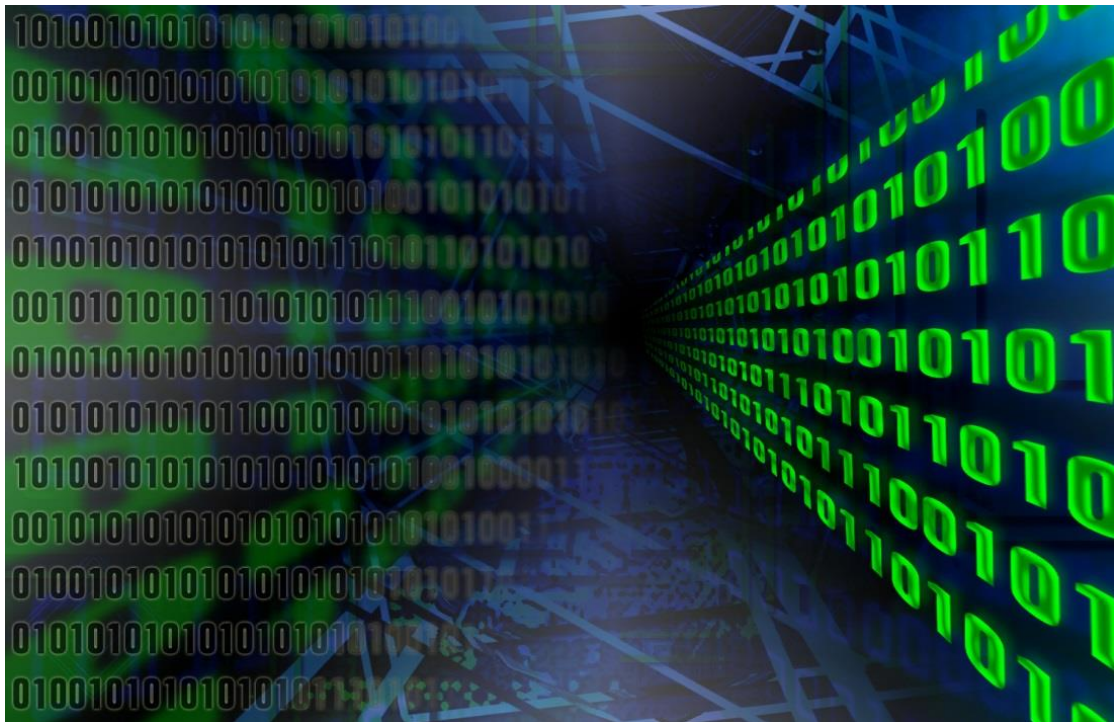
Disease intervention is going to be more effective, reliable and sustainable if more people can share information across ecosystems.

THE BIG PICTURE: mHEALTH AND BIG DATA

The major benefit of mHealth technology is that it helps to collate large amounts of health data. This data can be housed in large databases which can sustain health research and innovation. This is known as big data. Big data as stated by the European Commission Green Paper on mHealth (2014) is the *“capacity to analyse a variety of (unstructured) data sets from a wide range of sources. This requires the capability to link data and extract potentially valuable information from unstructured data in an automated cost-effective way.”*

Big data delivers several advantages:

1. In epidemiological research, big data can help researchers and scientists improve healthcare by analysing patterns on a greater scale.
2. New conclusions and correlations can be found using big data.
3. Big data can also reduce trial periods for medications.
4. Big data can contribute to advancing mechanisms for early detection and prevention of diseases.



Real-time big data can contribute towards more focused drug therapies in line with the projected expansion of mHealth apps and sensors. As Pat Hyek, Global Technology Industry Leader at Ernst & Young, asserts *“smart mobile devices and applications, working in concert with cloud computing, social networking and big data analytics, will be at the core of global healthcare transformation. These transformative technologies will continue to lead with ways to help rein in cost, broaden access, change behaviours and improve outcomes.”*

The Sustainable Development Goals (SDGs), a set of 17 goals and 169 targets, has sparked a debate on building better data to improve community resilience and meet global development targets. In developing countries, big data is increasingly used for

framing and directing national health systems and policies to address health needs within its population. However, gathering such data remains challenging, yet acknowledging data challenges will help discover more focused solutions for the Global Goals, especially Global Goal 3 on good health and well-being.

Researchers from the Center for Policy Dialogue, Normal Paterson School of International Affairs and Southern Voice on Post-MDG International Development Goals (Halais, 2015) highlighted several challenges of data gathering that will impact development effectiveness:

- 1. Data gaps.** Significant data gaps exist disproportionately in low-income countries. The biggest challenges on data gaps are on goal areas that are new to the post-2015 climate, such as environmental sustainability and disaster resilience.
- 2. Capacity gaps.** Many ministries and national statistical offices simply do not have the proper human resource of infrastructure to meet their commitments to the COP21 agenda for the data revolution. The process of measuring progress runs into the problem of data that is too old or of poor quality. Governments should allocate a greater share of their national budgets to data collection.
- 3. Official versus unofficial data.** While the post-2015 Data Test focused on official sources of data, it looked at opportunities in each country to strengthen ties with unofficial sources. In certain areas, such as infrastructure and energy, private sector sources can fill the gaps. However, governments often lacked the ability to validate information coming from NGOs, think tanks or academics. In such cases, national statistics offices should work on developing coordination mechanisms between these different sources. Additionally, citizen-generated data can deliver more localised perspectives on the SDGs.
- 4. Leave no one behind.** One of the main challenges around collecting disaggregated data has to do with the political dimension of data, since marginalised groups can be unaccounted for by national governments, or their status as a minority is left unidentified for historical reasons — for instance many countries leave ethnicity out of their national census. The conversation around how to implement and measure the SDGs will have to address the political context surrounding data in a strategic way.

Finance and data are intricately linked. When aid is directed towards long-term development projects to boost infrastructure and services more people can access and afford these services. This means tapping into the well-built technology industry to support the health sector.

Successful implementation of mHealth strategies is assuring the usability of the data, primarily for patients and doctors. Not every patient will have same needs, and the presentation of actionable information will need to be tailored to fit individual needs. In addition, simply providing more medical data to patients will not guarantee improved outcomes. As consumer demand for wearable sensors increases, health care providers will face the possibility of being inundated by a torrent of patient data.

Development of sophisticated data analytical tools and user-friendly platforms is

critical. as it will maximise the usability of both patient and doctors data for data presentation.

Furthermore, greater uptake and use of mobile data by practitioners and health authorities is needed for informed real-time decision-making. Okey Okuzu of InStrat Global Health Solutions asserts: *“The biggest challenge of improving is not so much technology but more around the human factor. More attention needs to be paid to that. We need educational campaigns to help people.”* To encourage better conditions of healthcare, further data analysis and utilisation by healthcare professionals in the developing world is required. . Further health care data analysis will enable healthcare workers to take full advantage of the mobile health revolution and introduce new tools to improve medical service delivery.

Despite the challenges on gathering meaningful big data, domestic health systems are already making progressive strides towards health solutions using mHealth technology and moving closer to a big data architecture.

Big data and national vaccination campaigns

Mobile devices are one of the most successful avenues to improve vaccination rates. More than one million children die every year from vaccine-preventable diseases and over 22 million children worldwide remain unimmunised. The WHO (World Health Organization) has identified vaccinations as the single most cost-effective public health intervention after the provision of clean water supplies.

To this end, Vodafone is now working with the GAVI (The Global Alliance for Vaccines and Immunization) and GlaxoSmithKline to explore how health ministries in sub-Saharan Africa can use mobile technology to improve access to vaccines and increase childhood vaccination levels. The partnership is focused on using SMS text messages sent to expectant mothers to help raise awareness about the importance of vaccinations and remind parents to attend scheduled appointments.

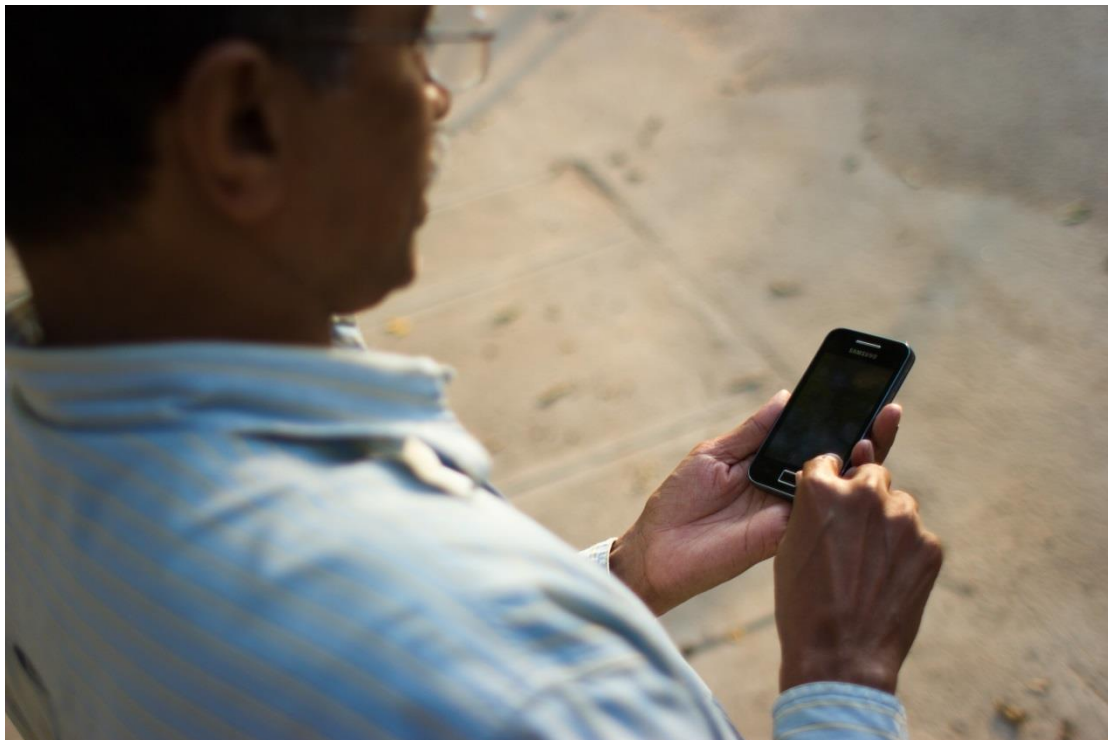
During emergency immunisation in South Sudan in 2013, almost 850 Red Cross volunteers were mobilised in the three states of Greater Equatoria to help bring the polio message to the doorstep of more than 250,000 families. Simultaneously, trained volunteers conducted household surveys to map immunisation coverage and identify areas not included in previous vaccination campaigns. Combining volunteers' door-to-door work with real-time data collection and mapping has been a resounding success. Data collected in South Sudan has been shared with health authorities, detailing the exact location of missed households through the use of GPS, and indicating the number still eligible for vaccination. Data showed the key role played by volunteers in mobilising parents to adhere to the campaign: over 94 percent of children under five were immunised, up from 84 percent before the 2013 campaign.

The development of technology-oriented approaches to humanitarian action, combined with extensive work with frontline health volunteers, is essential to improve equitable access to health services.

BREAKING INTO THE MOBILE HEALTH MARKET

According to Visiongain's report "Top 20 Mobile Health Companies 2015", the mHealth market is highly fragmented with over 80 percent of apps generating fewer than 50,000 downloads. Therefore, creating approaches to ensuring the optimal marketability of medical apps will help protect against financial loss and strengthen the visibility of the best medical initiatives. In doing so, such med-tech companies are well poised to increase their share of a rapidly growing market.

Apps that are catered towards patient demand, such as those linked to patient care on drug adherence, information and appointments, are more likely to be adopted. Apps that are more regulatory, such as those designed for outpatient monitoring and disease control receive more resistance. Nevertheless, apps that recognise high-risk groups such as those suffering from chronic diseases, undiagnosed populations as well as providing medical management and educational awareness of the acute conditions, are commonly adopted.



Vula Mobile is a South African start up that connects public health workers in rural and remote areas to specialists in hospitals in the city. Vula Mobile enables health workers to capture basic patient information and record personal medical data through photographs. Each patient file has eye tests results as well as a brief medical history included as part of the information issued to a specialist. Patients can be given medical advice through a dedicated messaging platform and discuss the most suitable course of action for the patient.

The story of Vula Mobile highlights how the mobile health market is expanding to fit patient needs and expectations. Vula Mobile started out with an initial focus on eye health and is now exploring other ways to create innovative solutions by breaking into the global mobile health market.

Start-up companies within the mHealth market rely heavily on commercial contracts that provide financial support to branch out after a few successful ventures in mobile health innovations. Vula Mobile is an example of how entrepreneurship is paving the way for mHealth to reach its potential in providing digital health benefits. This year the start-up secured a contract to explore opportunities in mobile developments.

Innovation on this level is not only plugging gaps in the markets on service provision for patients but also creating a better way for health professionals to work effectively and efficiently within their own culture of time restraints.

Apps that prove effective in clinical trials and other implementations showing consistent engagement and improved health outcomes have the potential to be successful once launched in the medical market. Utilising apps may result in fewer emergency room visits as well as lead to the greater prioritisation on EHRs (electronic health records). Furthermore using apps will improve inpatient risk level stratification with ultimately reduces costs to insurers. These are agreeably desirable and marketable outcomes.

Such successful ventures and ambitious outlooks in technological development do not come without their challenges. Med-tech companies need ensure that their apps are compatible with multiple phones and platforms. Successful med-tech companies will seek partnerships with telecommunications providers to form a common framework that allows exploring both software- and hardware-based solutions.

Entrepreneurial investment in the mHealth initiatives is imperative to bring the mHealth sector up to date with overall healthcare, working productively, securely and effectively in the best interests of patient care. The private sector has a unique ability to innovate by creating financially self-sustaining solutions to address patients health needs. Active cross-sector engagement is critical to the success of global efforts on this issue. Growing populations and rising health spending creates new opportunities for companies to meet these challenges through business, philanthropy and CSR initiatives.

Successful mHealth focused companies will be those that can remodel or redefine the corporate approach to health. Payers of medical apps can encourage leading mHealth-app developers to use particular hospital networks as a way to test their device. Glen Giovannetti, Global Life Sciences Leader at Ernst & Young, asserts *“Life sciences and healthcare companies are increasingly expected to demonstrate to payers how their offerings improve health outcomes and the efficiency of healthcare delivery. Reducing costs will ultimately require a greater focus on preventing disease and influencing patients to better manage their own health. Successful companies will seek to extend their business models beyond the drug or device to offer payers, providers and ultimately patients more value – all of which will be accelerated by mobile technologies.”*

mHEALTH SECURITY AND PROTECTION

Confidential information in health records that contains personal, financial and medical data is highly lucrative for cyber hackers. PwC's Global State of Information Survey of 2015 has shown that nearly 25 percent of all companies detected fifty or more security incidents last year. Cybersecurity threats affect the entire internet ecosystem, therefore all parts of the ecosystem must work together to prevent, detect and mitigate threats.

Greater momentum is being urged towards the development of regulations, standards and guidelines as well as ensuring these are in place to comprehensively protect patient confidentiality and security. Tanya Accone and Sean Blaschke, Health Systems Strengthening Specialist, UNICEF, state "*[m]any countries still do not have updated cyber and data privacy laws, which in many cases continue to allow NGO's to capture, transmit, store and provide access to very personal health data that would be illegal in the countries many of them come from. In some cases, NGO's have very personal and sensitive data that local government, and even the individual, cannot access.*" Governments should support development of strong, progressive eHealth strategies together with policy and regulatory frameworks to promote investment in this space.



User trust is paramount to any successful medical app. This will require strong privacy and security tools, particularly around data encryption and authentication mechanisms applicable to mHealth devices. While large electronic medical records products are available to streamline referrals, they are predominantly web-based, require installation of expensive software and are not currently able to run on smartphones. A regulatory balance is necessary to provide adequate patient protection but also to promote interoperability and common standards. The solution is both in technology and policy.

Guaranteeing health data security is increasingly paired with patient's confidence to have full disclosure to their doctor. PwC Health Research Institute study suggests 56 percent of consumers that concerns over privacy and security of their medical data would influence their decision to tell doctors "everything" about their conditions; 51 percent stated that these concerns would also affect their decision to participate in clinical trials. Such concerns will clearly create impediments to doctor-patient communication and medical research. Sean Martin McDonald, CEO of FrontlineSMS, argues that this is presently a growing concern: *"The vast majority of organisations globally do not have publically expressed data treatment policies, nor are there enforcement or appeals ecosystems. The result is that many people do not realise how their data is treated, why, or how they can seek help if they suspect their rights have been violated."*

The further issue lies in licensing. Jackie McCarthy, Director at CTIA-The Wireless Association, highlights the case of the US: *"Mobile health is responsible for a significant portion of the estimated \$400 billion in annual economic activity attributable to spectrum licensed to U.S. wireless carriers. Mobile health devices and apps require robust network connectivity for their increasingly data-intensive platforms. Licensed spectrum fuels this connectivity, but is a limited resource, so policymakers must look to make additional licensed spectrum available to wireless carriers so they can continue to expand the connectivity that serves as a backbone for mobile health."*

mHealth is still in the early stages of setting the regulation groundwork. Therefore solutions must be set in place ready to respond to security threats so that its key stakeholders are protected. A collaborative corporate framework should be also be sought to to expand the mHealth industry. In terms of technology, the approach taken behind Apple's HealthKit provides a best practice guide for other companies looking at enhancing their tech-security features. With the Healthkit, information is saved to the device only, which means it cannot be synchronised between devices via iCloud. By policy, Apple prohibits other apps from doing the same. This dramatically decreases the potential of the devices being hacked; it is up to the user to decide with which services the information is shared and to what extent.

While mobile phones have emerged as the most reliable way of communication and mobile reporting of CHWs, there is are issues with data protection and security. A way to circumvent these is by effectively training frontline health workers in remote and rural areas on proper storage practice as well as uses of mobile medical data. Community health workers are often challenged in their environments because of inadequate data collection, training and resource material, communications and scheduling. CHWs need to be trained in the use of mobile phones for health care delivery application and effectiveness of mobile tools, including data collection and reporting, emergency referral, alerts and reminders and supervision.

Cybersecurity measures will need to account for consumer needs, focusing on creating health data that is private, secure and accessible without compromising on consumer demand for real-time access to data on their mobile devices. As health providers and patients integrate mobile technology into care, they must continue to collaborate with the technology industry to share learnings, evaluate new technology, and communicate how mHealth can address challenges in care.

Recommendations

1. **Watching internal and external threats:** Health systems will need to continually monitor for internal breaches, and hire cybersecurity personnel if necessary as well as ensure there are technical strategy in place to defend against external threats.
2. **Ensure data awareness and initiate the correct consumer permissions:** Organisations must understand the information they collect. Retaining an inventory of medical devices collecting data is also crucial. Safeguards that enhance operations and meet consumer needs should be prioritised.
3. Responsibility must be placed on **national legislators** to ensure **accountability of** organisations involved in the design, supply and functioning of mobile health apps.
4. Legislators should develop **building blocks and tools** to support developers to **improve the role of privacy in the design of tools**.
5. Organisations should design devices and apps that provide **transparency** when informing users of the data that will be processed.
6. **Best practices and lessons learnt:** learning from other industries is one of the ways to avoid preventable mistakes. In particular, the finance sector has experience of balancing the need for security and privacy with consumer satisfaction. Doors should be left open for collaboration with other industries to accelerate development and encourage entrepreneurial participation.

Reigning in on Counterfeit Drugs

The circulation of counterfeit drugs to patients in countries with poor medical regulation is an extremely dangerous and deadly practice that highlights the need to protect patients from fraudulent practices. The WHO estimates that of the one million deaths from malaria each year, 200,000 could have been avoided if the medicines used had been of adequate quality. Counterfeit drugs are a growing industry: according to the Centre for Medicine in the Public Interest, the sale of falsified medicines earned 75 billion dollars in 2010, a figure that has grown by 90 percent over five years.

In Kenya, mobile provider Orange in partnership with mPedigree has developed a text messaging platform to help identify counterfeit medicines. The service allows consumers to text a coded number on the medicine packaging to verify legitimacy of the product. Sproxil is another similar service which is currently operating in countries such as India, Nigeria, East Africa and Ghana. The success of such programmes is due to the benefits they offer their wide range of stakeholders; including pharmaceutical firms, pharmacies, purchasers and mobile phone companies. The costs are also suitably minimal. Initial trails in Kenya have shown that thousands

of messages have been sent to the server, which indicates the potential for wide expansion in emerging and mature markets.

One of the major challenges to mPedigree penetration is its sustainability. At present, mPedigree has not found a commercially viable business model. This is a problem faced by many companies or charities that have mHealth programmes. Financial sources are often short term and unreliable. Connecting sustainable business models to mHealth programmes will ensure more long-term scalability behind successful innovation like mPedigree.



The WAHO (West African Health Organization) announced adoption of the mPedigree technology platform as a regional standard aiding in the recognition of counterfeit drugs. Pharmaceutical manufacturers are also in discussions with mPedigree regarding deployment of their African operations platform. mPedigree is proving a very useful in raising awareness about counterfeit issues in the region. For Bright Simmons, President of the mPedigree Network, the system offers a mechanism for *“bridging the public health and IP protection concerns of the public and private sectors and is a means for vendors to position themselves as quality suppliers and IP-compliant businesses.”*

Recommendations

1. Developing **sustainable business models** will require working in **multi – stakeholder partnerships**, including NGOs, government agencies, and pharmaceutical companies.
2. Securitisation for drug verification apps: codes that are **one-off encrypted number** that incorporates the **batch code and expiry date** to foolproof the system.

GLOBAL CONNECTIONS: EXPANDING MHEALTH

Health in the post-2015 agenda

In September 2015, world leaders committed to 17 Sustainable Development Goals to achieve by 2030, notably to end extreme poverty, fight inequality and justice, and halt climate change. Each SDG and the targets herein must reach 7 billion people within 15 years if these targets are to be met. Access and delivery of healthcare is critical to achieve this, which is highlighted in SDG 3: “Ensure healthy lives and promote well-being for all at all ages.” In the drive to “leave no one behind” recognising the intersection of mobile technology and global health will be essential to delivery on this Goal.

With the launch and adoption of the SDGs, the use of technology to solve current and future health challenges will be more widely recognised, Other benefits include expanding the health space to allow for other mature and emerging markets,. Mobile health technology will be increasingly seen as the gateway to equality over the next 15 years.



At the Measurement and Accountability for Results in Health Summit (June 2015) the *5-Point Call to Action* was adopted to support more effective health programmes at country-level. The *5-Point Call to Action* proposes priority actions and specific targets for health measurement and accountability for post-2015 that will enable countries to monitor implementation of *The Roadmap, supporting the SDG framework*. The *Call to Action* emphasises the need to:

1. Increase the level and efficiency of investments by governments and development partners to strengthen the country health information system in line with international standards and commitments;

2. Strengthen country institutional capacity to collect, compile, share, disaggregate, analyse, disseminate, and use data at all levels of the health system;
3. Ensure that countries have well-functioning sources for generating population health data, including civil registration and vital statistics systems, censuses, and health surveys tailored to country needs, in line with international standards;
4. Maximise effective use of the data revolution, based on open standards, to improve health facility and community information systems including disease and risk surveillance and financial and health workforce accounts, empowering decision makers at all levels with real-time access to information;
5. Promote country and global governance with citizens' and community's participation for accountability through monitoring and regular, inclusive transparent reviews of progress and performance at the facility, subnational, national, regional, and global levels, linked to the health-related SDGs.

In order to ensure mHealth solutions plays its role in sustainable development, key challenges that are impeding its current expansion and adoption need to be overcome. There are several recommendations in this regard:

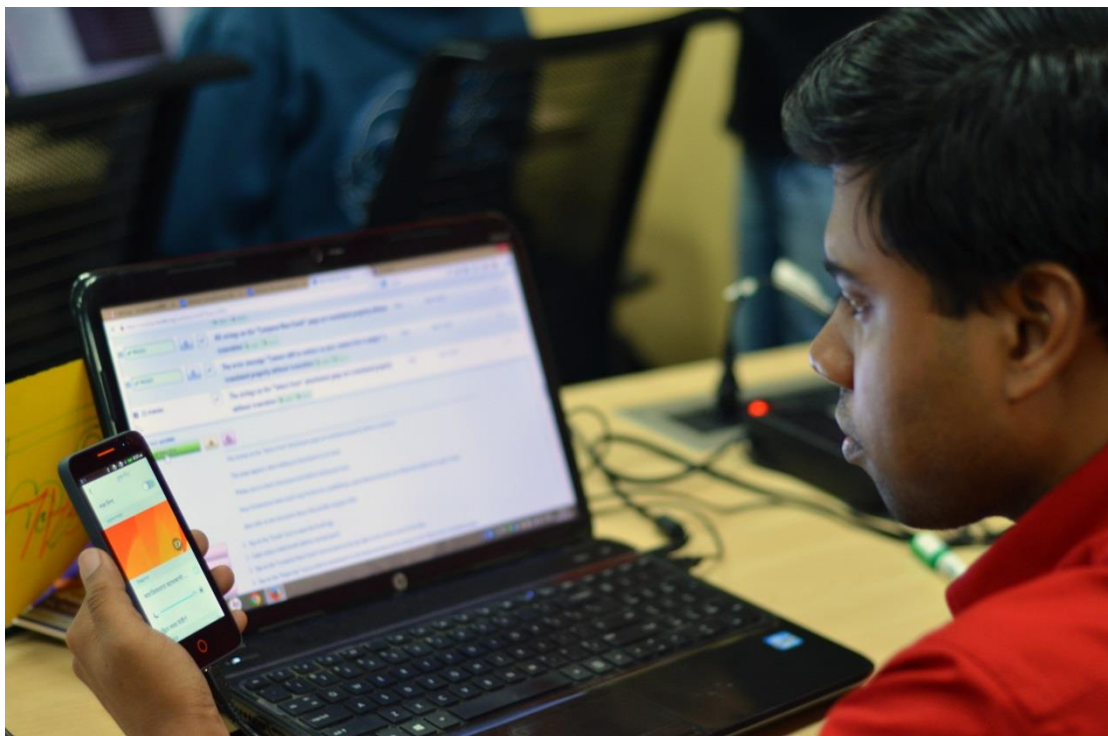
- Focus at system level, mapping information workflows throughout a system and making the structure of those workflows public (Sean McDonald, CEO FrontlineSMS).
- Understand the quality requirements of that information, how it influences clinical care decisions, and what the end vision looks like to build better ecosystems (Sean McDonald, CEO FrontlineSMS).
- Gather data using mobiles, such as using the ODK (open data kit), which will also increase speed and efficiency of data collection. This will allow for more real-time analysis and evidence to speed up the decision-making time (Jonathan Brass, International Federation of the Red Cross).
- Promote ease of practical use, including ability/access for charging phones, network coverage, start-up costs for systems such as TERA and additional expenses relating to using phones (Jonathan Brass, International Federation of the Red Cross).
- Improve data protection in the humanitarian industry and security of information systems to reflect health policies (Jonathan Brass, International Federation of the Red Cross).
- Recognise the limits of mHealth solutions in each context: As distinct from the developed world, very poor and marginalised communities that have little contact with basic health and education services and no experience with communication devices have trouble comprehending even the simplest health

information communication via mobile phones. In such cases, alternative and more appropriate solutions should be provided (Yvonne MacPherson, Director, BBC Media Action USA).

- Localise mHealth interventions: mHealth must be grounded in social, cultural and demographic realities of target populations and address the unique barriers and facilitate behavioural change. The key to localising mHealth is research, such as using formative and ethnographic research to understand key barriers to attitudinal and behavioural change (Yvonne MacPherson, Director, BBC Media Action USA).
- Scale and sustainability will rely on selecting technology that is already in use and is easy to use as this will avoid dependence on external resources to fund new handset distribution or ongoing training on how to use new technology (Yvonne MacPherson, Director, BBC Media Action USA).

RESEARCH AND DEVELOPMENT

Research and development (R&D) is vital to tackle long-standing health issues to build on the progress towards the Sustainable Development Goals (SDGs), specifically Goal 3 to “Ensure healthy lives and promote well-being for all at all ages.”



The U.S. Global Development Lab is the USAID’s newest entity designed to fund breakthrough innovations across the globe to “accelerate development impact faster, cheaper and more sustainably.” The lab makes high-risk, low-cost investments in projects, with the potential to increase funding for those that show promise. This allows more space for experimenting and “failing small” where government aid

funders cannot afford the risk. The lab is piloting sensors and mobile surveys as a way to obtain timely and gender-disaggregated data to measure the impact of projects it funds. While still at its early stage and yet to be authorised by Congress, it should be included as model in the next stage of development funding, ensuring that innovation can accelerate development gains.

The Global Innovation Fund (GIF) invests in a range of innovation that can demonstrate social impact on a wide scale. GIF defines ‘innovation’ broadly to include new business models, policy practices, technologies, behavioral insights, or ways of delivering products and services that benefit the poor in developing countries. For innovators looking at mHealth solutions, GIF may be an important source of funds, as well as resources including technical assistance and access to a global network of other innovators, experts, and funders. GIF provides financing from USD \$50,000 to \$15 million, with the largest funding amounts reserved for innovations that can demonstrate evidence of success and the potential to spread across multiple developing countries.

Apple’s ResearchKit programme is an example of how mobile technology can transform research to generate more rapid assessment of interventions, and more focused and scalability results.



INNOVATION

mHealth technology has its greatest potential in the developing world. mHealth is opening new ground by focusing on solution-based responses to solve the healthcare and disease prevention needs within these countries. Furthermore bringing to light healthcare in remote areas where services, resources and institutions are either lacking or inadequate to cater to patient demand. In developing countries, as mobile devices become more accessible and affordable, mHealth becomes more accepted. Given the fact the most people have access to mobile phones it is a ready vehicle through which to approach and promote healthcare communication.

With more patients taking the driver's seat in healthcare, innovation will be premised and motivated by the desire for patients to be active participants in their own care. New technologies, as well as regulation, standards and tools, are aligning with this shift towards patient engagement. Successful adoption of mHealth will therefore depend on how much value the technology adds to patients' wellbeing and how easy it is to use. Adoption will increase as the "network effect" (use is related to the square of the number of users in a network) drives greater collaboration and sharing of information.

AIDF's first report of this Mobile for Development series (November 2015) highlighted the need, with aging populations and the rising prevalence of Non Communicable Diseases (NCDs), to focus on mHealth technology solutions that can positively influence and monitor lifestyle decisions in order to prevent major health events and control spiralling healthcare costs.

Wearable devices have become a convenient way to capture rich context for a range of purposes to transform the practical, day-to-day activities of people in different industries. Its use for mHealth is no exception. Wearable devices are expected to represent the next wave of mHealth solutions and will potentially act as the gateway to the connected health world. The market for sensors and wearable devices is expected to reach US\$ 40 billion by 2018.

Wearable devices include biometric sensors, such as bracelets, watches, skin patches, headbands, earphones, and clothing, whose unifying function is to provide unobtrusive, passive, and, where necessary, continuous monitoring. The prime advantage is the ability to seamlessly track and transfer all bio-metric data into an actionable and informative user interface that can be shared with health care providers, researchers, family members, or one's social network.

The challenge is to align new technology solutions presented by sensors and wearable devices with government health ministries and participating organisations. Thus ensuring a sustainable way to increase the level of healthcare education, treatment adherence and access to basic healthcare services. The issue is that while multiple mHealth platforms are being created by IT vendors, funders, providers and device manufacturers, the mHealth sector still remains highly fragmented. This presents an opportunity for the healthcare cloud infrastructure to build a new connected healthcare architecture that will become a logical extension of the global health movement as supported by the Sustainable Development Goals.

With the expanding role of mHealth in national healthcare systems, ensuring the sustainability of innovative healthcare solutions and thereby the efficient delivery of care will require adequate training of digital skills. The rapid uptake of mHealth programmes is due to the overwhelming necessity for these services. While most doctors and other medical personnel are concentrated in urban areas, the majority of the population live in rural and remote areas, especially in developing countries like India and China. Lack of resources and insufficiently trained medical staff means that effective and quality care remains in constant demand.

The push behind mHealth acceptance and adoption is largely due to the high cost of medical care which makes basic healthcare unattainable by those in developing countries. In many of these places, mobile technology has become the only means to reach people in remote areas and ensure the continuation of healthcare. For instance, Bangladesh's Grameenphone in cooperation with the Telephone Reference Center, Healthlink allows its customers to talk to a doctor any time of day or night. Furthermore, in Bangladesh where there is one doctor per 4,000 people, Healthlink service has been very popular bringing in more than 3.5 million calls in the last six years. Increasingly, such cases show how mHealth technology is rapidly becoming the only platform providing health solutions. By comparison, technological innovation in mature markets is aimed at convenience and substitution for other technology.

In India mHealth innovation is helping the rural poor access the technical expertise and efficiency of the medical sector in major cities. India's healthcare industry is currently valued at \$99 billion, growing at the rate of 12 percent annually, to reach \$139 billion by 2017. However, while the healthcare industry continues to grow, it is under immense pressure to cater to the needs of 1.25 billion people, a significant majority of which live in rural areas. To frame the challenges in India, the ratio of doctors per 1,000 people is just 0.6 whereas in Brazil and China it is 1.8; India has only 1.3 hospital beds per 1,000 people -significantly lower than the guideline of 3.5 beds defined by the WHO. To meet WHO's base guidelines and ensure the medical manpower is in place, the sector would require an investment of around US\$ 245 billion over the next 20 years. This is where mHealth has brokered major ground to leverage innovative solutions to support and ensure the optimal productivity of the healthcare sector already in place. According to Deloitte, the telemedicine market in India is valued at \$7.5 million and is expected to rise 20 percent annually to reach \$18.7 million by 2017. Technology is seen as a vital strategic element in healthcare delivery to enable access and provision in remote and rural areas of India. The challenges and solutions in India provide the gateway for other countries in the developing world to break through the mHealth market to benefit complex domestic health needs.

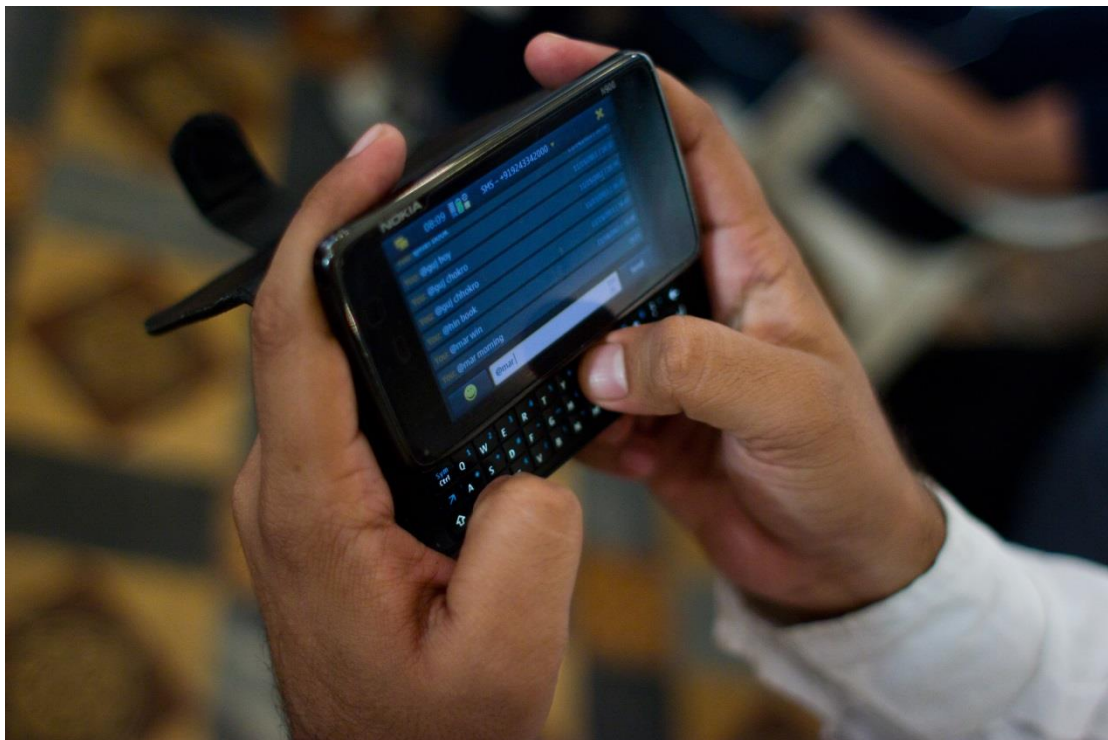
Next steps

- 1. Identify apps and services that provide concrete value to targeted stakeholders** i.e payers that must clearly discern the benefits.
- 2. Identify opportunities** related to specific needs and markets where they may be well placed to act in support of **national health plans**

3. **Keep a global perspective:** since much of the innovation will take place in emerging markets, these new mHealth innovations that can be transferred to mature markets.
4. **Focus on solutions:** payers will invest in technology because of the kinds of solutions they provide rather than the technology itself and what it can do.
5. **Prioritise and build the business case** for the opportunities that make most sense in light of the **company's strategy and local health needs**
6. **Build partnership capacity** that increase **impact and add new value:** mHealth ecosystem will advance as profitable partnerships emerge. This will help ensure best practice around use of technology and smooth its adoption.

THE WAY FORWARD

mHealth could lead to a paradigm shift in healthcare. At present, medical care is premised on a paternalistic system, but the increasing dissemination of mHealth initiatives means patients have greater knowledge and power within their grasp, transforming the relationship into a more collaborative one.



mHealth's future will be bright in an increasingly integrated ecosystem. Many of the trends outlined at the beginning of this report will continue in the next few years i.e. reducing diseases, increasing speed of networks, and decreasing costs. Entrepreneurial activity in mHealth innovation that focuses on community needs, user availability of technology, enhances individual's health, and allows for district level collaboration, is a model that is more likely to be accepted, adopted and is scalable. In future, many of these innovations will be aimed at prevention of diseases rather than

treatment of non-communicable diseases in the developing world. The mHealth benefits of low cost, broader coverage, and real-time health solutions will help overcome shortage and unequal distribution of health care workers in resource poor countries.

Technological advances, such as new network generations, intelligent mobile devices, and wireless devices can support mHealth applications to reduce negative health impact and provide valuable solutions. The use of 4G technologies will provide cost-effective high data transmission rates and even larger bandwidth that plug gaps in healthcare efficiency. Smartphone technology will also enjoy wider outreach and more smartphone applications will be used in health services for remote monitoring and healthy lifestyle promotion. Telemedicine will assist diagnostics, consultations and follow-ups by sending visual information through mobile camera devices. The mHealth market will expand as dependency on mHealth technology increases and it becomes fully integrated as the norm in health care delivery.

The upward trend of health spending in developing countries points to a long-term opportunity for companies. In these countries, the size of health markets, measured both by population and by value, is growing rapidly – faster than GDP. Leading companies are starting to find ways to create shared value by innovating around products, value chains and clusters (the health systems, infrastructure, supporting industries, policies and social norms that surround business operations). This is helping patients gain access to affordable health care – while also creating short- and long-term value for the business. At the global level, it is possible to identify a number of areas where companies may be well positioned to fill gaps in the provision of health care. Innovative public-private partnerships can help ensure that the right people are in the right place, and with the right resources and technologies to improve patient's health.

Research and development will continue to be important to identify the most effective mHealth programmes. In this case, mHealth Alliance is working with its partners including the WHO and John Hopkins University on the Global mHealth Initiative aimed at selecting and advancing the most promising mHealth programmes.

It is important to bear in mind that technology is only responsible for part of the success. Technology acts as an intermediary in improving health outcomes; developing the human component is also crucial. Investment in training, education and resources for health workers needs to parallel to mHealth sector innovation. Overall, mHealth technology will provide massive health improvements in both developing and developed world, while also creating a more educated and proactive health care workforce.

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