The Socio-Economic Impact of Mobile Health

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Note to the reader

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Executive Summary

In the coming years, mHealth—the provision of health services enabled by mobile communications—will revolutionize the way healthcare is delivered. From text message campaigns disseminating information on healthy lifestyles to the use of smartphones as medical devices capable of diagnostics and remote monitoring, mobile technology will permeate every aspect of global health systems. In the process, this technology will cut the costs associated with provision while maintaining and improving quality of care and reaching patients for whom access to healthcare has until now been limited.

However, a number of barriers need to be broken down before mHealth can begin to transform health systems and service delivery. Moreover, a diverse range of stakeholders must collaborate in order for mHealth applications to be adopted on a wide scale.

For this reason, Telenor Group commissioned The Boston Consulting Group to study the potential impact of mobile services on healthcare over the coming years. This report summarizes the findings of the study, which focused on 12 markets that Telenor serves. These countries have been grouped into clusters representing three broad developmental ranges:

Cluster A: Norway, Denmark, Sweden, Hungary, Serbia, and Montenegro
Cluster B: Thailand, Malaysia, and Russia
Cluster C: Bangladesh, Pakistan, and India

In each grouping, we look at the healthcare, medical, and system challenges these countries are facing and analyze different mHealth solutions to these challenges. The report estimates the impact of the various mHealth applications and, more broadly, describes the potential social and economic implications of mobile technology for individuals, healthcare providers, governments, and other stakeholders in the healthcare ecosystem.

Critically, the report assesses what is needed from stakeholders—including regulators, infrastructure providers, healthcare providers, and application developers—for a mutually beneficial mHealth ecosystem to evolve. Key among these players are the telecommunication companies that, because of their deep technical, regulatory, and market expertise, and their ability to scale up solutions, can act as intermediaries between the different players in the health ecosystem and take on a central role in the evolution of mHealth.

Introduction

Increasing access to new health technologies that leverage the power of mobile communications—both in emerging and developed markets—promises to deliver better health solutions around the globe. This study examines how mobile solutions can help address health challenges and increase the benefits of improved healthcare in 12 countries, ranging from the least developed to the most developed.

The World Health Organization's (WHO) definition of health as "a state of complete physical, mental, and social well-being, not merely the absence of disease or infirmity" should inform approaches to healthcare. Health is a fundamental good, both for individuals and for society as a whole. For individuals, good health leads to a better quality of life and education, enhancing their ability to find a job and to secure a higher lifetime income. In addition, healthier workers are less frequently absent from the workplace, and lower levels of absenteeism lead to cost savings for companies.

For society as a whole, a healthier citizenry reduces pressure on overburdened hospitals, clinics, and medical professionals. It also reduces inequalities based on gender, income, or geography, and means that a greater proportion of the population can be employed, which increases gross domestic product, generates higher incomes for citizens, and increases tax revenues. This lowers demand for the services provided through public safety nets, charities, and non-governmental organizations. In short, an effective, accessible healthcare system is a prerequisite for economic growth and has clear benefits across society.

New solutions urgently needed

In the face of the mounting pressures on healthcare systems in all countries, new solutions are urgently needed. Governments will be unable to continue to deliver quality services to all of their citizens with existing resources and traditional methods. Not only will they find budgets stretched as demands for healthcare services increase, but, in addition, large numbers of new medical professionals and support staff will need to be added to the sector's workforce, putting further cost pressures on the healthcare ecosystem. In mature economies, there is a growing awareness of the potential crisis that could hit welfare systems if nothing is done to change the status quo.

In contrast, developing economies often struggle to provide adequate healthcare to all of their citizens, especially in rural areas. Another aspect of the challenge developing countries face is their need to meet the health-related targets of the Millennium Development Goals (MDGs) by 2015. In Pakistan, for example, this will mean reducing by some 53 percent both the number of deaths per 1,000 live births of children under the age of five and the number of maternal deaths per 100,000 live births.

Combating diseases such as HIV/AIDS and malaria will also stretch the resources of countries such as Bangladesh. To meet its MDG targets, Bangladesh will need to bring down the prevalence of tuberculosis per 100,000 people by some 60 percent.

Whether serving older patients or those suffering from communicable diseases, mobile technology will be critical to solving future global health challenges. And with global market penetration of cell phones approaching 100 percent, mHealth is an idea whose time has come.

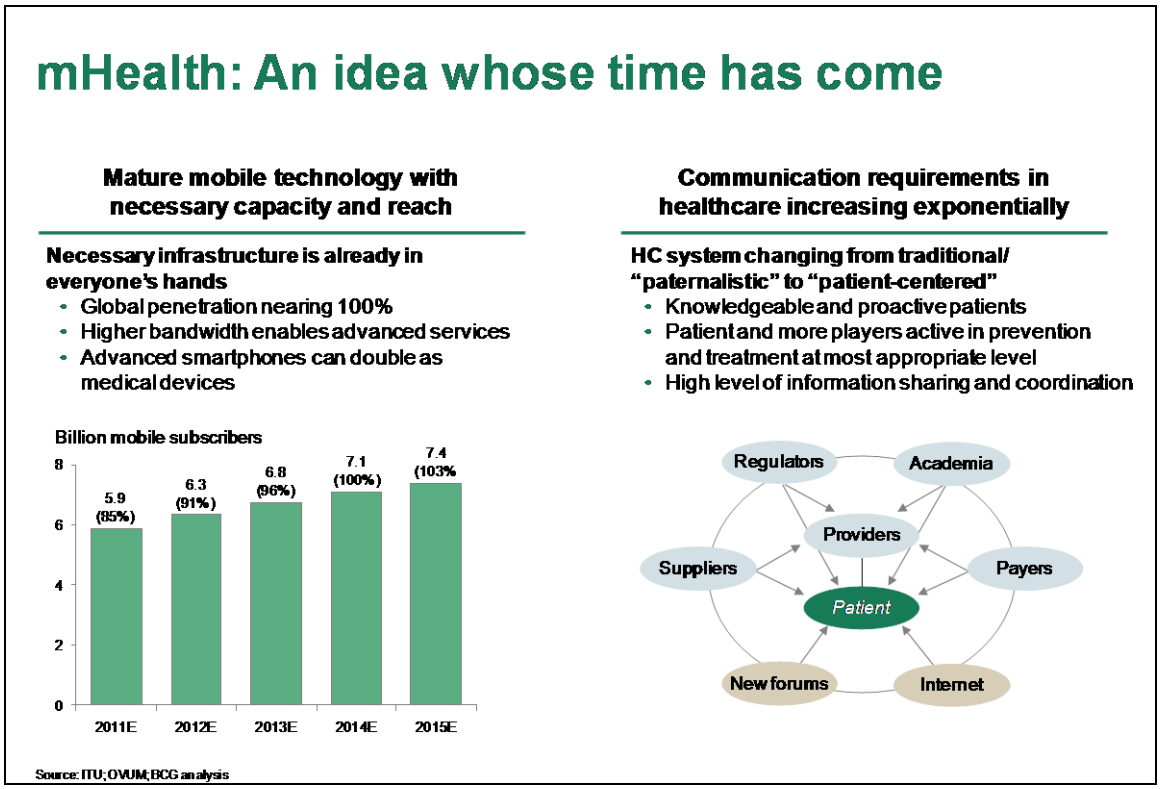
The mobile phone has many advantages when deployed as a healthcare tool. First, even the simplest models can become powerful pieces of equipment: text messages and phone calls can deliver real-time, critical information quickly and easily, which means those living in remote areas can reduce unnecessary travel to health centers to consult with doctors and nurses.

However, as mobile devices become increasingly sophisticated, they can be used to do more than simply transmit information and advice. Smartphones and broadband-enabled devices can become medical devices, used for monitoring vital signs and body functions or as videoconferencing equipment, facilitating remote consultations.

In addition, as people use their mobile and smartphones to access an increasingly wide range of services—from interactive maps to weather forecasts—wellness and diet programs and exercise regimes can be added to the growing number of apps available at the touch of a button.

Meanwhile, healthcare communications requirements are increasing exponentially as more patients have their health data electronically recorded (facilitating the sharing of information between patients and healthcare providers), and as remote monitoring systems make it easier to manage conditions such as heart disease and diabetes.

In the process, the healthcare system is undergoing a cultural shift—from the traditional paternalistic approach, in which doctors talked and patients listened, to a more patient-centered approach in which individuals equipped with knowledge and information can play a much more active role in prevention and care.



The world of apps is set to transform healthcare in the coming years. It is estimated that some 30 percent of smartphone users are likely to use wellness apps by 2015, while the smartphone and tablet are becoming the most popular technological development for doctors since the invention of the stethoscope.

With a smartphone in their hands, individuals can engage in activities that improve their health and prevent disease. Some of the apps promote fitness, with guidance on diet and nutrition as well as incentives to work out, relax, or take up certain sports. With apps that guide users to everything from nature trails to theatre and concert performances, smartphones also provide the means for inspiration and relaxation.

Mobile technology is also transforming the way doctors do their work. In the U.S., more than 80 percent of physicians are now using use smartphones for personal and general use, and increasingly, doctors will use their smartphones—as well as other devices such as tablets—as digital assistants. Mobile devices will allow them to access medical reference material, training content, and professional journals.

The apps available on these devices will also turn them into tools that assist with patient monitoring, imaging, and bedside care. And many companies, seeing the commercial potential of these trends, are developing professional apps exclusively for healthcare professionals.

Freeing up health resources

For governments trying to cut the costs associated with operating a healthcare system, mHealth will help hospitals and health centers reduce paperwork. By speeding up processes, reducing the possibility for human error, and avoiding duplication, remote access to centralized electronic health records can reduce administrative burdens by 20 to 30 percent.

This, in turn, helps address another of the problems countries are facing—shortage of skilled, qualified physicians and health workers—since cutting back on administration means that professionals can spend more time with their patients.

Moreover, the apps enable patients to take a more active role in their own healthcare—managing appointments, updating prescriptions, and accessing their health records. And when patients take on more responsibility for their own care, their health improves. Evidence shows that 86 percent of women taking this approach undergo breast cancer screening (compared to the average of 57 percent) and 99 percent of people undergo cholesterol testing (compared to the average of 55 percent). Meanwhile, proactive care leads to a 10 percent reduction in primary and urgent care visits, since mobile technology often helps people with sudden health incidents to treat themselves or access information about health concerns.

In countries where resources are under increasing pressure, mHealth has the potential not only to cut costs but also to free up badly needed capacity. In Sweden, for example, remote consultation and support could save $65 million a year in hospital nights for patients with chronic obstructive pulmonary disease (COPD), as patients would be able to use remote monitoring and video-enabled smartphones to rehabilitate at home. Patients with conditions such as heart disease, diabetes, and asthma could also be treated in this way. Trials in Nordic countries show that mHealth could generate a 50 to 60 percent reduction in hospital nights and re-hospitalizations for patients with COPD. Taking data collected from pilots and projects in Scotland and Norway, it is estimated that mHealth could reduce overall elderly care expenditure by 25 percent.

mHealth cuts costs and saves lives

By performing a wide variety of functions, mobile technology has the potential to increase both the efficiency and reach of healthcare services—maximizing healthcare professionals' time—while also reducing costs of maintaining the delivery of quality healthcare along the value chain. It promises new remote diagnostic, monitoring, and data collection techniques, enhancing the efficiency of existing systems. And, critically for the countries we studied, it also has the potential to help patients take more responsibility for their own health, easing the pressure on healthcare workers and allowing a greater number of interventions to be made using technology. These are delivered through a wide range of instruments, enabling even non-mobile phone users to benefit.

When it comes to empowering citizens, mobile communications offer a means of delivering public education and health campaigns via texts or voice messages sent to mobile devices and smartphones. And because they can be used to remind patients with chronic illnesses to take their drugs or make appointments for check-ups, mobile phones become a powerful tool in medical compliance management.

For countries with aging populations, sensors connected to home alert systems improve safety and prevent needless deaths through accidents or falls. Mobile technology can do everything from checking on patients' vital signs—allowing those suffering from diseases such as COPD to rehabilitate at home—to sending individuals reminders to take their medications on time.

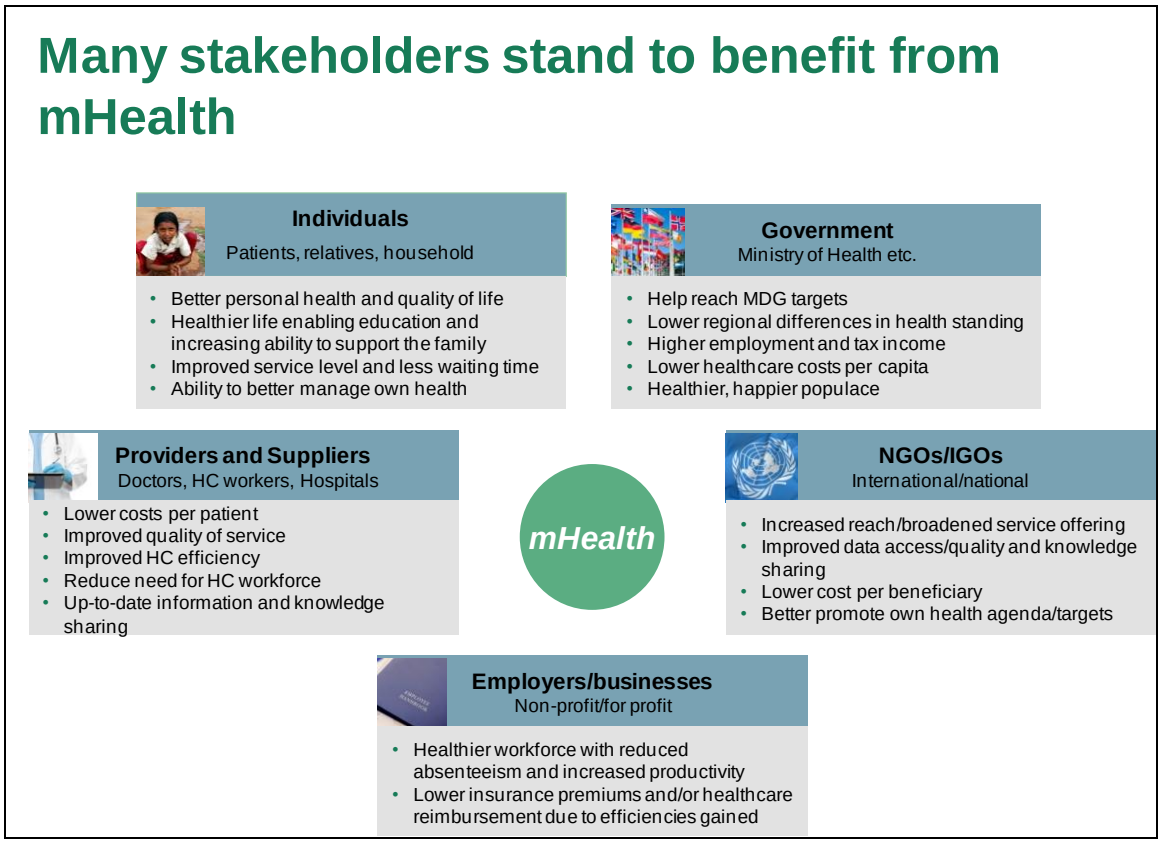
In these ways, technology will improve the lives of the elderly and chronically ill and help them to remain independent for longer. And because they require fewer face-to-face consultations and can spend more time at home, rather than in hospitals, mHealth cuts the costs associated with long-term care.

In nations with many citizens in remote rural areas (often developing countries), mobile technology allows doctors to reach more patients. Pilot projects in India show that, using remote diagnostics and telemedicine, doctors can reach twice as many rural patients as they could through face-to-face consultations.

mHealth also helps these countries combat communicable diseases. Because they can be used to send reminders to patients with tuberculosis (TB) to take their pills, mobile phones improve TB treatment compliance by between 30 and 70 percent, saving lives, since with effective medication compliance some 90 percent of those infected with TB can be cured. Pill boxes with integrated mobile capabilities can deliver similar benefits to those without mobile phones.

More lives can be saved by mHealth in countries in which infant and maternal mortality remain severe problems. By delivering advice via SMS to pregnant mothers and health information to nurses and community health workers, these deaths can be reduced 30 percent.

For governments, mHealth has the potential to reduce the per capita cost of healthcare while maintaining or increasing care quality. And as governments around the world start to explore different measures of human progress, wellbeing is increasingly being treated as an indicator. In this respect, mHealth has a role to play in improving new “gross national happiness” indicators by producing a happier, healthier populace, and has the potential to transform health service delivery.



Wide range of mHealth applications

mHealth promises new remote diagnostic, monitoring, and data collection techniques, enhancing the efficiency of existing systems. When it comes to empowering citizens, mobile communications offer a means of delivering public education and health campaigns via texts or voice messages sent to mobile devices and smart phones. And because they can be used to remind patients with chronic illnesses to take their drugs or make appointments for check-ups, mobile phones become a powerful tool in medical compliance management.

Mobile technology also increases the possibility of remote diagnosis by allowing patients and community workers to communicate with hospitals or healthcare centers via text or phone, maximizing the time of specialists and reducing trips to the hospital for patients with long-term illnesses.

With rising demand for a wide range of healthcare workers—from physicians and nurses to therapists, paramedics, and dieticians—supplementing the education of these professionals is another area in which mobile communications can play an important role.

Seven categories of mHealth applications

	mHealth category	Description	Examples
Information	Public information/ education	• Active spread of health information to general public • Help lines for medical and health questions	• HealthLine, Masiluleke, Text4Baby, Text to Change
Information	HC worker information/ education	• Remote education for aspiring healthcare personnel • Up-to-date information/guidance to healthcare work force	• DoCoMo MD+, Nacer
Information	Public wellness	• Applications to improve public wellness by encouraging improved diet, physical activity, quitting smoking, etc.	• iBodyMo+, iSmoke Break, EatRight
Record/ access data	Public health surveillance/tracking	• Surveillance and tracking of disease outbreaks and epidemics • Monitoring of pollution levels	• AESSIMS, Voxiva Health Watch, FrontlineSMS
Record/ access data	Remote data recording/access	• Recording/accessing patient journal data remotely • Supply chain management, e.g., authentication of medicine	• EpiHandy; Ca:sh, Horizon Mobile Care
Medical services	Diagnostic and treatment support	• Mobile telemedicine, consultations between healthcare professionals, decision support systems	• MD Consult Mobile, MEDgle, eMPOWERx
Medical services	Patient monitoring/ compliance management	• Monitoring patient health condition and treatment compliance • Alarm systems for individuals in need of clinical care	• GlowCaps, SIMpill, mQure Med Reminders

Source: WHO; Vital Wave Consulting; BCG analysis

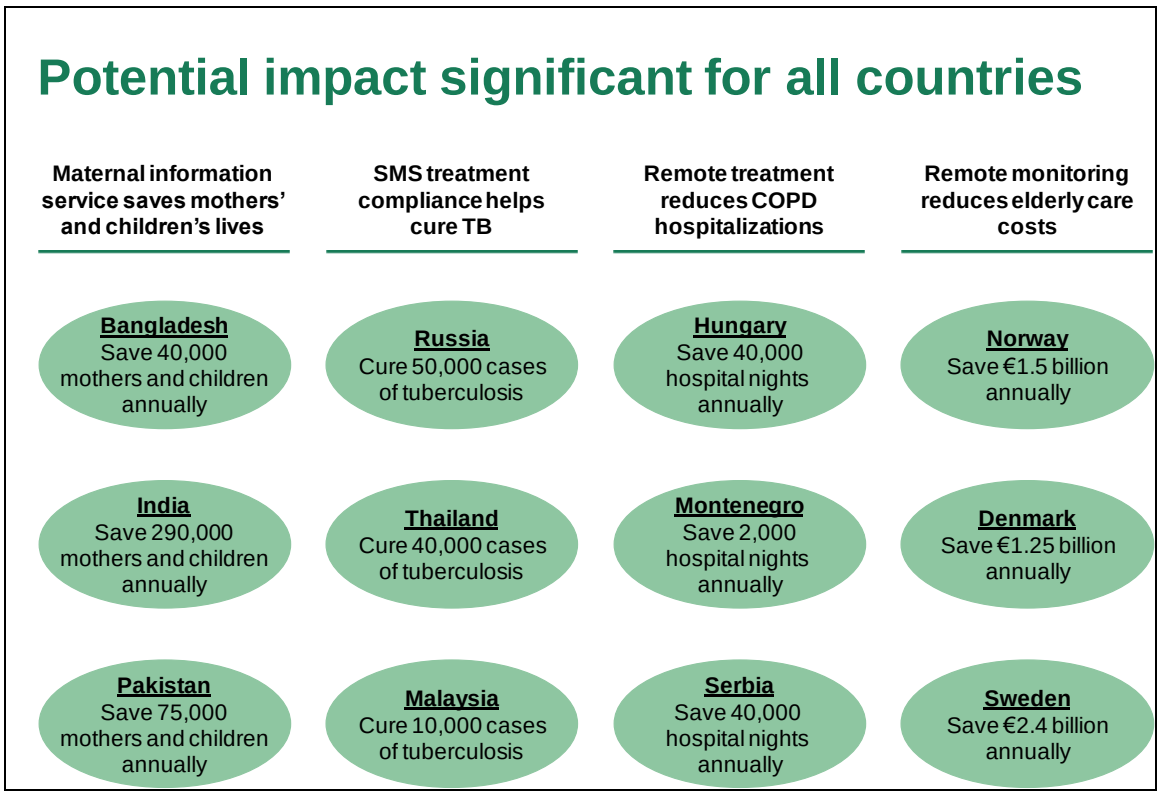
mHealth transforms lives

Tracing the experiences of individuals illustrates the power of mobile technology when it is applied to healthcare. Take the case of a 26-year-old pregnant mother living in India. Without the assistance of technology, the mother, whose home is in a remote rural village far from health centers and hospitals, has no doctors to consult about her pregnancy. She does not recognize or understand warning signals and therefore risks dying during labor.

With the assistance of a mobile phone, she can receive timely birth-related information and advice and become aware of any signs of danger during her pregnancy. Thanks to this information, she has a successful delivery and both mother and child go on to lead healthy lives.

On the other side of the world, a 69-year-old widower living in Stockholm has been diagnosed with dementia. Forced to rely on traditional face-to-face health services, he is unable to call for help when he finds himself in need. Unused to dealing with a complex medical regime, he frequently forgets to take his pills. He even gets lost when he goes out, unable to find his way home. He is a constant source of worry to his family, who question whether it is safe for him to continue living in his own home.

But when equipped with a range of mobile technology devices, the patient is able to manage his condition and continue to live at home, should he so desire. Automatic alarms alert healthcare professionals of anything unusual in his behavior and his family can track his whereabouts whenever he ventures outside the home. With easy-to-understand medical reminders sent to his phone, he remembers to take his pills on time, while wireless check-ups and electronic communications with his doctor mean he has to visit his health center less frequently. With the help of technology, he can remain in his own home for many years, living independently.



While more than 500 mHealth projects are now operating globally, much still needs to happen so that more people can benefit from the technology. Importantly, the capabilities of a range of stakeholders from all sectors need to be brought together to create the infrastructure, systems, and innovative applications that will enable mHealth to achieve scale. Work must be done to remove regulatory barriers, and countries and companies must commit to common technical standards.

Application providers need to come up with new services. Health service providers, whether public or private, need to embrace the new technological solutions. Regulators need to create the legislative landscape that accommodates these new solutions and to provide incentives that can persuade more health sector organizations to embrace the technology. Common standards need to be developed and adopted to facilitate interoperability across the healthcare system.

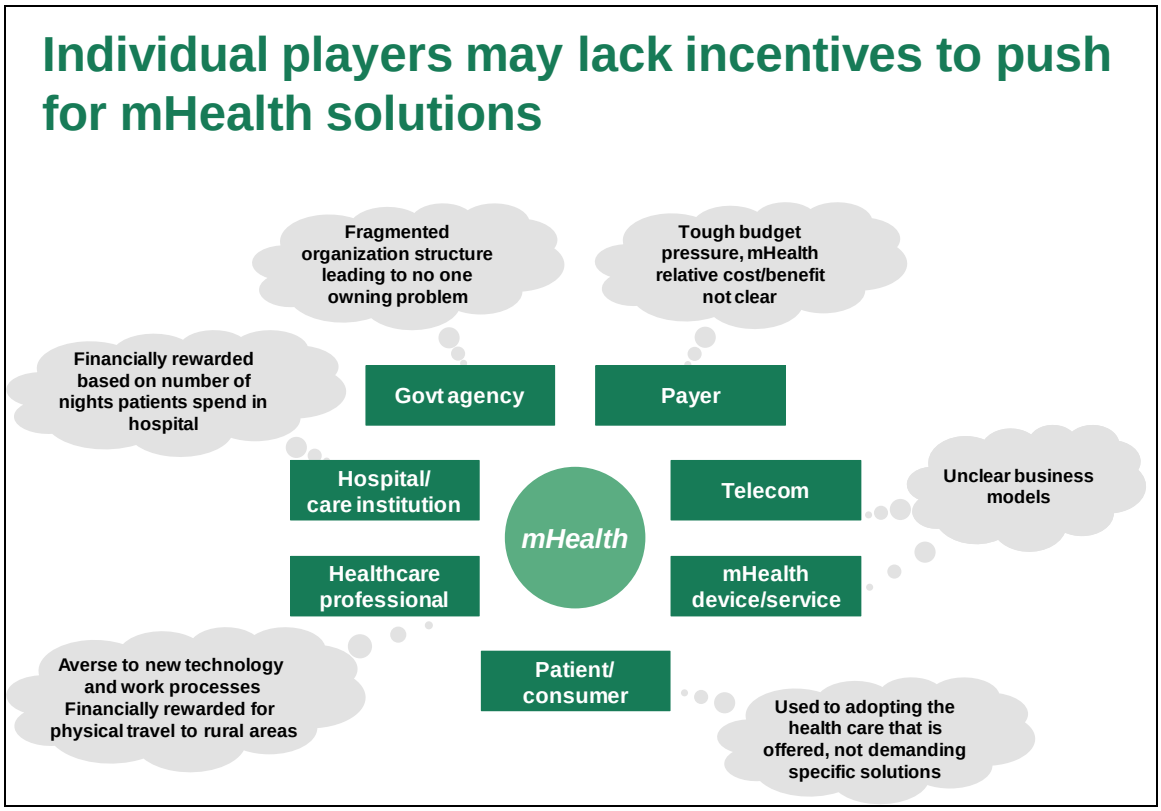
Collaborative efforts essential to promote mHealth

While the health sector has traditionally been inward-looking, developing specialized equipment and operating its own systems, the adoption of mHealth will demand far greater collaboration with a range of public and private sectors players than in the past, as well as increasing use of commercially available technology.

Capabilities from different sectors will need to participate in analysis, education, and evaluation if mHealth is ever to gain widespread acceptance. Without rigorous cost-benefit studies, for example, hospitals and medical practices will be reluctant to incorporate mHealth as part of the services offered.

In addition, these cost-benefit analyses will need to be comparable across regions and countries. Healthcare companies can play a critical role in developing common metrics with which to assess the benefits of mHealth.

Further tools in achieving widespread acceptance of mHealth will be education programs that are designed to inform patients and healthcare providers on the benefits of mHealth. Government, the private sector, and civil society organizations have a responsibility to coordinate their efforts, as no one sector can reach all corners of the healthcare ecosystem and its users.



Telecoms play a critical role

While split incentives and divided business models could serve as a barrier to the integration of mobile technology in healthcare, there is one industry that could play a powerful role in bringing together the diverse stakeholders in the mHealth system—the telecommunication sector.

Telecoms have in place the infrastructure and technical interfaces needed for mobile communications to become a tool in healthcare. These companies manage the backbone of the mobile network, its points of access, and its terminals. They also have considerable experience in providing sufficient coverage and quality of service.

The telecom sector has also shown that it is capable of scaling up solutions. It has experience in the development and implementation of international standards and is able to move quickly to capitalize on rapid innovation in products and services.

As companies versed in customer service and understanding customer needs, telecoms are in a unique position to develop user-centric services. Since they have a recognized position in the marketplace, customers trust them to handle sensitive information. Meanwhile, they are also used to dealing with regulatory authorities and a range of partners, both domestic and international, from NGOs to handset manufacturers.

While building communications platforms and customer relationships, the telecom sector could also assume a position as the facilitator at the heart of the mHealth ecosystem.

Call to action: Realize remote monitoring opportunity

	Overall business model	Service design and development	Customer acquisition	Customer life cycle management
Key outcomes	• Sustainable business model • Clear, operationalized links to health priorities	• Move toward scalable, cheap, open, and operator agnostic platform	• Rolled out via health providers • Offered as service to consumers	• Gather useful feedback • Monitor impact
Government	**Align incentives, especially for HC workers**	**Remove any hindering regulations** **Provide stable regulations**	**Adopt and roll out**	
NGOs (patient interest groups)	**Disseminate best practices**			
	Provide knowledge of user needs		**Educate public on advantages of service**	
HC providers		**Incorporate new ways of working**	**Embrace new technology**	**Collect impact evidence** **Gather user feedback**
mHealth service/tech provider		**Design using interoperable, common standards**		
Telecom		**Build open API/platform** **Act as integrator and roll out**	**Use customer relationships to acquire and retain customers**	

Cluster A: Norway, Denmark, Sweden, Hungary, Serbia, and Montenegro

Key Health Challenges

Most people living in mature economies in Europe have access to high quality healthcare systems, often free of charge. However, these systems are coming under increasing pressure. While incidences of communicable diseases are at manageable levels, and malnutrition and infant, child, and maternal mortality are less of a concern, lifestyle-related illnesses such as lung cancer and obesity are increasing. Non-communicable, non-lethal, and chronic diseases make up more than 80 percent of the national health burden. These conditions include psychiatric and mental illnesses and chronic pain, such as back pain. Meanwhile, as their populations continue to age, new healthcare challenges are emerging, with a rise in demand for long-term care.

An aging population

While rising life expectancy is generally a positive development, longevity also brings with it a complex new set of challenges. Chronic illnesses that might once have killed sufferers—such as cardiovascular disease, dementia, arthritis, and diabetes—can now be managed. However, these conditions increase demand for long-term and palliative care.

Aging populations therefore place heavy cost burdens on governments. Human resources in particular will become an increasingly difficult to manage in the healthcare sector, since a growing number of workers will be required to maintain service levels, potentially outstripping the supply of skilled professionals. Norway's prime minister, Jens Stoltenberg, has outlined the scale of the challenge. "To sustain the current level, one of three youths need to start working in healthcare," he stated in June 2011.

The Cluster A nations of Norway, Denmark, Sweden, Hungary, Serbia, and Montenegro are all wrestling with the rapidly escalating costs of delivering care. Costs in countries are set to rise between 30 and 55 percent by 2025 from 2010 levels.

All countries are aware of the fact that, with aging populations, they will need to increase the number of healthcare workers in the system. Norway, for example, has identified finding "adequate personnel with relevant competence" as a key challenge, while Montenegro believes a critical strategy will be "to open post-graduate studies in the field of public health, which will ensure new knowledge and progress in the health sector."

An aging population and decreasing numbers of younger people also means that these countries will have fewer economically active citizens and thus fewer people to pay for the system. And as more healthcare workers are needed to care for older people, expenditure on salaries—already the biggest cost component of many countries' healthcare systems—is likely to increase.

At the same time, healthcare is becoming more "patient-centric." Individuals who are adept at Internet research can find out more about their own conditions online, and they expect to be more involved in decisions about their healthcare.

Given these trends, younger family members will have to become increasingly involved in the treatment and care of their older relatives. However, patients also increasingly expect to take more responsibility for their own health maintenance and in decisions about their treatment.

For our Cluster A countries, the challenge will be to continue delivering effective, affordable healthcare to their citizens in the face of rising costs, pressure to make available new treatments and technologies, and tightening national budgets.

A new focus on individual responsibility

In these countries mHealth is an idea whose time has come. Wellness apps can improve public information, help prevent lifestyle diseases, and increase life expectancy. Remote consultation and treatment support can reduce the number of hospital nights for rehabilitating patients. Home monitoring reduces care costs and improves quality of life for the elderly. And remote access to electronic health records cuts administrative burdens for health centers and empowers patients to take more responsibility for their own health.

To address their healthcare challenges, European countries have come up with ambitious plans, ranging from Hungary's "Johan Béla" National Programme for the Decade of Health to Norway's National Health and Care Plan 2011-2015.

Many of the plans focus as much on changing the lifestyle and behavior of citizens as they do on increasing the quality and accessibility of healthcare services. Among Denmark's public health objectives, for example, is a target of reducing the percentage of daily smokers to 20 percent of the population in the next five years. Sweden aims to "to provide the conditions for the entire population to increase its physical activity," while Hungary's goal is "to improve the general state of health through healthy nutrition."

A related trend among the governments of the countries we studied is a growing desire to help their citizens take on more responsibility for their own healthcare—and many see technology as playing a critical role in this respect. The Norwegian government's health plan, for instance, states that "healthcare technology can give people new opportunities for independence and safety [and] support both users, family and employees." And Montenegro's master health plan includes proposals for

the "development and expansion of health education and training" to help in "increasing the responsibilities of the citizens for their own health."

In order to meet national health goals, mHealth will be needed to promote public wellness through increased information and education; to provide diagnostic treatment, support, and patient monitoring; to promote compliance with medical regimes; and to enhance health analysis by remote data recording and access to electronic patient records.

mHealth could help reduce some of the costs associated with salaries in the healthcare system. Technology can reduce manpower costs by providing a more efficient means of detecting problems and offering solutions, thereby reducing the need for face-to-face consultation.

Socio-economic Impact of mHealth

When it comes to using mobile technology to deliver healthcare, the advantage for countries such as Norway, Denmark, Sweden, Hungary, Serbia, and Montenegro is that citizens are familiar with using their phones for a range of services that already extend far beyond voice mail and text messages. Today's smartphones are more like miniature computers, with users able to do everything on them from accessing street maps to finding the nearest restaurant. This means acceptance of mHealth is likely to be high.

Moreover, the necessary infrastructure is widely available, with mobile penetration close to 100 percent in these countries. High bandwidth provides access to advanced services, and advanced smartphones can double as medical devices.

Freeing up resources

In the study countries, where resources are under increasing pressure, mHealth has the potential not only to cut costs but also to free up badly needed capacity. In Sweden, for example, remote consultation and support could save €50 million a year in hospital nights for patients with chronic obstructive pulmonary disease (COPD), as patients would be able to use remote monitoring and video-enabled smartphones to rehabilitate at home. Patients with conditions such as heart disease, diabetes, and asthma could also be treated in this way. Trials in Nordic countries show that mHealth could generate a 50 to 60 percent reduction in hospital nights and re-hospitalizations for patients with COPD.

Giving independence to the elderly

An aging populace is currently the largest health challenge in the Cluster A countries. By 2025, the proportion of people aged 70 and older will range from 12 percent (in

Montenegro) to 17 percent (in Serbia and Sweden). Unless major changes take place in the way healthcare is delivered, this demographic shift presents serious challenges for the governments of these countries, as the number of citizens needing medical care will increase rapidly. For these countries, mHealth has the potential to deliver affordable care to the elderly and allow people to remain independent longer.

Key to this is the concept of home monitoring services. Aided by mobile technology, home monitoring can greatly improve the lives of elderly. As sensors become more common and more sophisticated, they can be connected to home alert systems, giving older people safety and security and preventing minor incidents, such as a fall, from becoming life-threatening events.

In addition, sensors can be used to activate electronic pill dispensers that help patients take their medicines on time. They can also be used as moisture and location detectors and epileptic alarms. Field trials conducted in Norway, Sweden, and Scotland suggest that sensor technology could deliver significant benefits for individuals and for the people responsible for their care.

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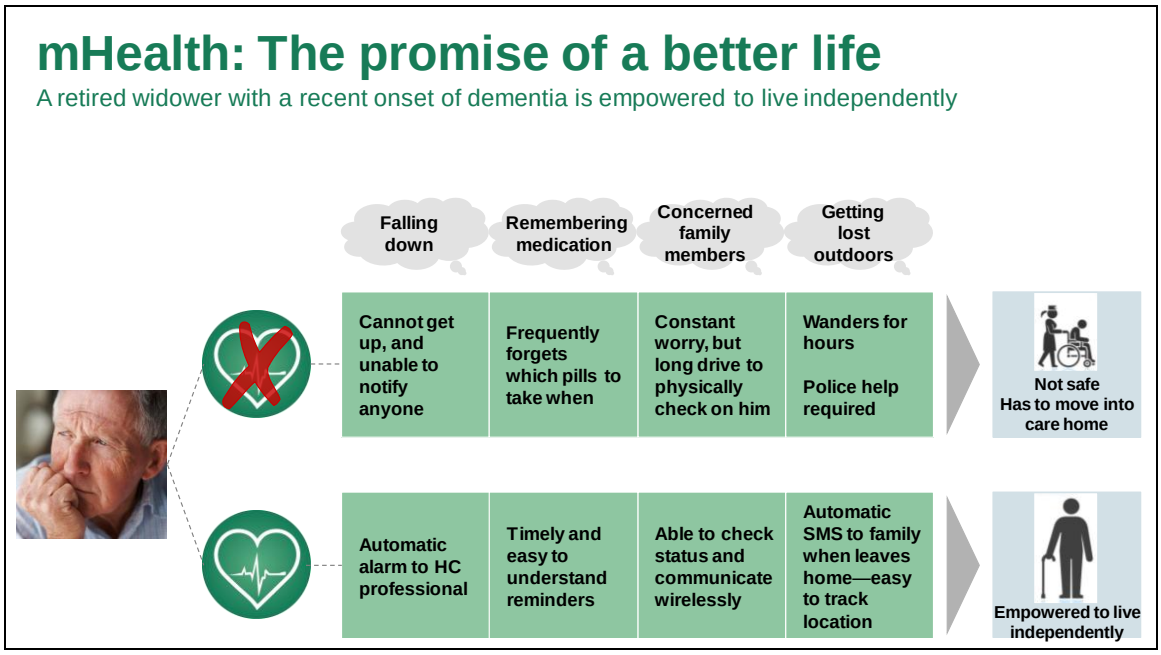
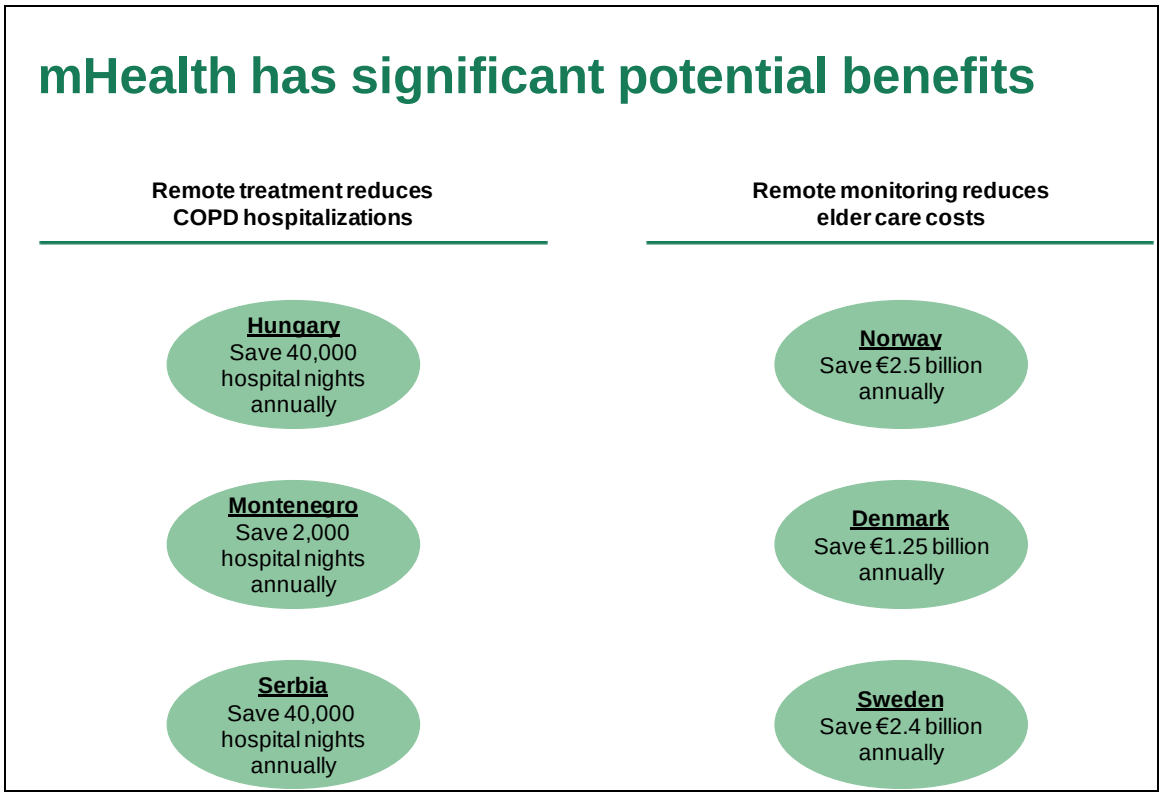


Take the example of a retired widower facing the onset of dementia. Today, he might have to consider whether, as the disease progresses, he should take up residence in a care residence. With mobile technology, however, he can spend far longer in his own home.

First, if he falls down, an alarm is automatically sent to a healthcare professional, who can send out a response team. And if he is on a drug regime, rather than struggling to remember which pills he should take and when, he can receive automatic electronic reminders that are timely and easy-to-understand.

Meanwhile, family members no longer have to visit in person to check up on him—they can check his status regularly and communicate with him wirelessly. And rather than worrying about him wandering away from home and getting lost, the family receives a text message whenever he leaves the house and can track his location while away. This gives greater freedom and flexibility, although care must be taken to avoid creating the impression that the elderly are being "abandoned."

As well as making life easier for older people and patients with chronic, non-lethal conditions, home care is far cheaper than traditional hospital-based healthcare. Research conducted by Age Scotland showed that by reducing hospital and care home bed days the "Housing with Care" program, which includes a technology package, can generate savings of about 25 percent compared to the cost of healthcare services delivered in care home.



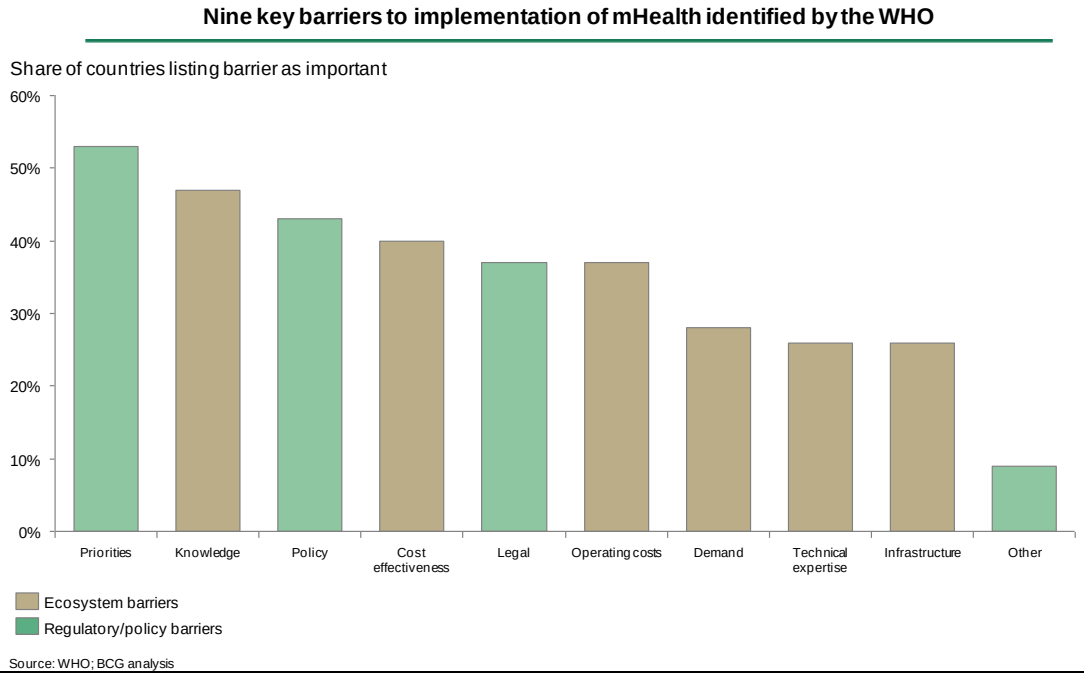
Making mHealth Happen

We identified a number of promising projects in all six of these Cluster A countries. These pilot projects include a home-based healthcare project in Norway, in which a range of sensors and alarms are deployed as a means of allowing disabled and elderly people to live in their homes for longer. A project in Sweden is facilitating

remote monitoring for patients with diabetes and cardio-vascular disease, while a Hungarian program is running remote cardiac monitoring systems. In fact, remote monitoring—which is seen as the technology with the highest financial and social return on investment, given current healthcare challenges—is a focus for many of the pilot projects. Some eight out of the 11 projects we identified were trialing remote monitoring applications.

There is definite evidence of growing interest in mHealth; however, before mobile technology can really start to transform healthcare delivery, these projects need to achieve scale—something that will require shifts in the healthcare ecosystem and changes in the regulatory landscape. While these projects look impressive individually, they are by no means representative of broader trends in healthcare or a significant rise in the adoption of mHealth. Despite showing promising results, many projects are abandoned after the pilot stage, largely because they lack sustainable business models. And even though projects have the potential to serve millions of people, many report that they are only serving thousands or hundreds of users.

mHealth faces multiple barriers to full-scale implementation



Source: WHO; BCG analysis

New rules needed to shape mHealth landscape

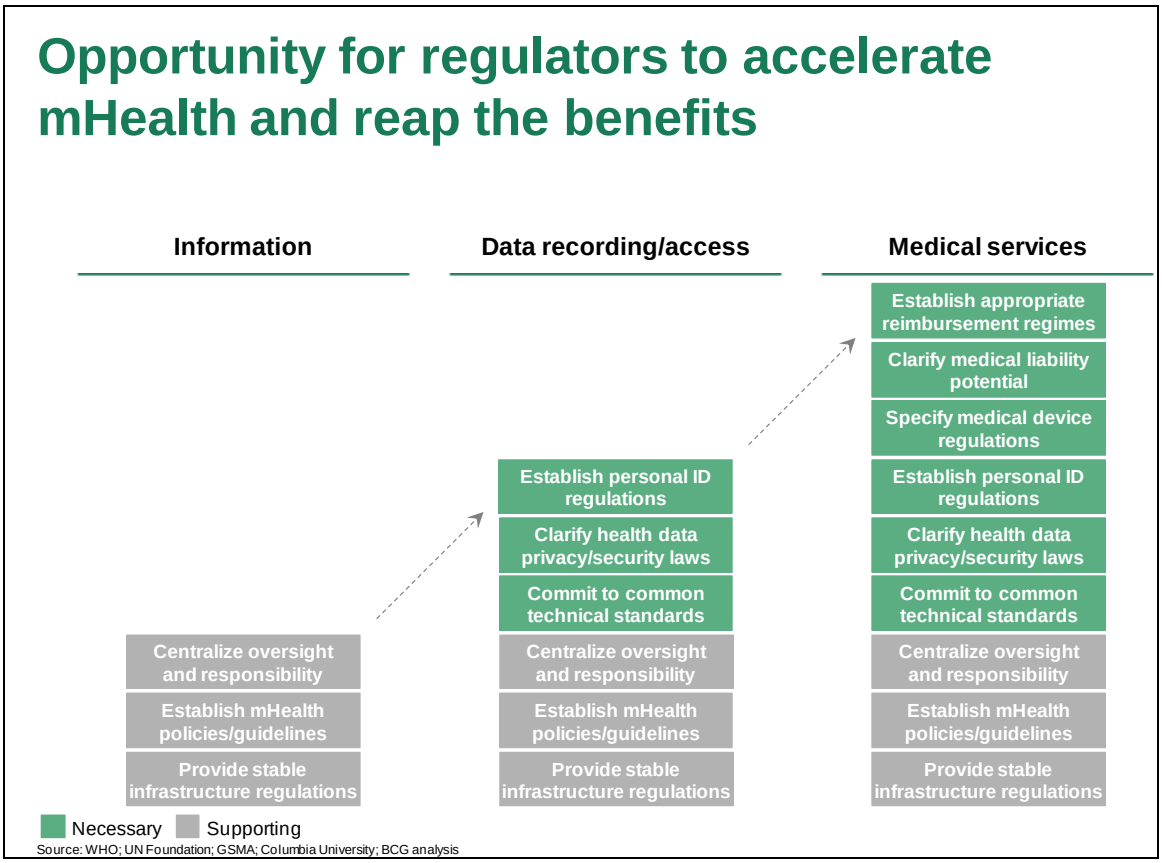
When it comes to the policy regulatory environment, uncertainty is a major barrier

to widespread deployment of mHealth in this group of countries we studied. Few governments have placed mHealth at the center of national healthcare policies and policymakers are struggling to keep up with rapid technological developments.

Regulatory uncertainty also has an impact on individuals and their perceptions of mHealth. In the absence of clear policies on information security and patient confidentiality, many potential users may be hesitant to use mHealth systems. This is partly why demand in these countries for mHealth is low among the general public.

While the health systems of Norway, Denmark, Sweden, Hungary, Serbia, and Montenegro remain overburdened and in need of further investment, governments face competing priorities. So far, industry has not been able to demonstrate the potential value and sustainable business models of mHealth, and with insufficient knowledge in this area, policymakers tend to invest where evidence is more readily available.

To achieve scale in mHealth, changes in regulatory regimes will be needed, as will greater collaboration among stakeholders throughout the entire healthcare ecosystem.



At the policy level, a number of initiatives must be implemented. Part of this involves changing traditional reimbursement models to create incentives to improve health outcomes (rather than increased visits and treatments) and that allow for payment for interventions that take place remotely. In addition, new areas of medical liability must be defined.

As mobile phones play an ever-greater role in healthcare, regulators need to distinguish between regulated medical devices and commercial communications infrastructure. Standards and interoperability across the overall health system will also be essential if mHealth is to achieve scale.

While projects and initiatives may develop at local and regional levels in the hands of a wide range of authorities, governments need to be able to take a holistic view of the role of mHealth across the national healthcare system in order to identify problems and come up with potential solutions. This will help them keep their health policies in line with national and international health goals and develop standardized metrics for the evaluation of progress and impact.

Supporting these initiatives, governments need to establish clear and stable regulatory regimes regarding mobile network coverage to ensure that the entire population has access to mHealth options.

Privacy, security, and common standards

While developing countries struggle to guarantee access to healthcare and to collect accurate data, the more pressing challenges for countries such as Norway, Denmark, Sweden, Hungary, Serbia, and Montenegro are to ensure that health information is protected and that common technical standards allow data to flow between patients and their various health providers.

Simply changing the law is not always sufficient to guarantee the flow of information. In Sweden, for example, despite the signing of the patient data act, which enables different care givers and individuals to access electronic patient journals, health providers are having difficulties living up to the demands set out in the act. Further complicating matters is a lack of certainty on whether mobile solutions are covered by the act.

Sweden's National Board of Health and Welfare is now making efforts to clarify the legal status of electronic information exchange. However, the Swedish case illustrates the difficulty of ensuring regulatory environments keep pace with technological developments.

Guaranteeing interoperability also presents issues. In Serbia, for example, lack of standardization is proving a barrier to a widespread mHealth rollout. Despite the creation of an IT rulebook with technological specifications, variations in the standards in development and implementation by different health centers and mobile providers means that the country has only a limited capacity to exchange health data electronically.

One potential way forward would be to maintain a clear focus on technical and data interoperability for any future projects and to work with the European Commission's eHealth task force on developing standards and policies that are aligned with the technological demands of mHealth.

While transparency about privacy is clearly critical for building public trust in mHealth projects, and interoperability is essential to scaling up the use of mobile technology in healthcare, payment models also need to be adjusted to accommodate an increase in remote care and treatment.

Current models do not always support mHealth, as is the case in Norway, where the organizations responsible for technological investments are not necessarily deriving the benefits and doctors may have limited financial incentives for adopting the new technology (for example, if they are paid per patient visit, rather than for successful treatment outcomes).

In many cases, doctors are compensated for face-to-face consultations with patients, and receive additional compensation if they have to travel to rural areas to conduct these consultations. For this, and similar payment-related reasons, the medical establishment can sometimes be reluctant to embrace mHealth.

Countries in which financial incentives for mHealth are poorly defined therefore need to explore new approaches that provide clear incentives for health providers to adopt new technological solutions.

Addressing the future of healthcare is critical for Norway, Denmark, Sweden, Hungary, Serbia, and Montenegro. While these countries do not face the kinds of communicable diseases and life-threatening illnesses found in developing countries, they have challenges of their own—notably in their aging populations and the rising costs of healthcare services. Mechanisms must be found to deliver continued high quality of health service to a growing number of people in need of long-term care.

Cluster B: Malaysia, Russia, and Thailand

Key Health Challenges

As the economies of transition countries continue to grow, their healthcare systems are becoming better equipped to extend high quality services and more sophisticated treatments to growing numbers of their citizens. They have also been able to address some of the health challenges faced by developing countries, such as reducing infant mortality and maternal deaths. Economic, social, and demographic changes are also putting increasing pressure on their healthcare systems.

The range of health challenges varies from country to country. However, Thailand, Russia, and Malaysia all broadly share difficulties in eradicating infant and child mortality and improving maternal health and family planning processes. Communicable diseases such as tuberculosis, malaria, HIV/AIDS, measles, and polio also remain prevalent among the populations of these countries.

In addition, these countries must now tackle the rising incidence of diseases often associated with more mature economies, including cardiovascular disease, obesity, cancers, diabetes, and illnesses that relate to lifestyles or age. Conditions such as psychiatric and mental illnesses and chronic pain are also on the rise, and are expensive to treat. This means that non-lethal conditions are taking up increasing amounts of the financial and human resources capacity of these countries.

Maintaining consistent care—with quality assurance of drugs and equipment—also remains difficult, and managing the overall costs of running the healthcare system presents growing challenges. The question for policymakers in Thailand, Russia, and Malaysia is whether they have sufficient numbers of physicians, nurses, and specialists to cope with the new health demands. Meanwhile, geographic location, social status, and low-income levels can still serve as barriers that prevent many citizens from gaining access to healthcare.

The broad range of challenges facing transition economies is reflected by a number of ambitious healthcare plans put forward by the Cluster B nations. However, these plans include a wide diversity of strategies, from promoting individual responsibility for healthcare to extending access to care to under-served populations.

For Malaysia, the emphasis is on empowering citizens to take a more active role in their own health. Within its four-pronged approach, Malaysia's healthcare strategy includes encouraging citizens to become more aware of the state of their own health and to take up healthier lifestyle activities. Another priority is empowering communities to implement individual wellness programs.

Meanwhile, Thailand's health strategy, developed with support from the World Health Organization, focuses on primary care and the control of communicable diseases and epidemics, as well as reducing incidences of non-communicable

diseases, injuries, and mental illness. The country also wants to bring together different sectors to roll out health services to poor and at-risk populations.

The battle against communicable diseases also continues in Russia, which is working with WHO in developing its health strategy. Russian healthcare policymakers want, among other things, to boost the country's ability to combat HIV/AIDS, viral hepatitis, and type 2 tuberculosis. Improving infant and maternal care is another priority for Russia.

The diversity of strategies being formulated by Thailand, Malaysia, and Russia shows just how complex their healthcare challenges are. While these nations still struggle to combat communicable diseases and to ensure that healthcare is available to all their citizens, they are also facing a rise in the non-communicable diseases and lifestyle-related illnesses that are more often associated with richer countries.

A shift in resources will be therefore needed. As life expectancy increases and income levels rise, driving up incidences of conditions such as heart disease and cancer, greater focus must be placed on early detection and prevention of non-communicable diseases. Meanwhile, an aging population means that the health issues of the elderly will start to demand greater attention as long-term and chronic conditions become more prevalent and as incidences of cancer rise.

Socio-economic Impact of mHealth

Transition economies share some of the health challenges facing developing countries—and these include the tough task of taking services to under-privileged and remote rural communities. Here mHealth has an important role to play. By offering the possibility for remote diagnostics and telemedicine, technology will extend the reach of healthcare services and ease the pressure on overburdened systems.

When it comes to using mobile technology to deliver healthcare, the advantage for countries such as Thailand, Malaysia, and Russia is that citizens are familiar with using their phones for a range of services that already extend far beyond voice and text message.

Mobile penetration is high among the citizens of these countries, which means acceptance of mHealth is likely to be high. Increasing bandwidth also enables them to use advanced services, including video, and the most advanced smartphones can double as medical devices.

Telemedicine solutions in other countries have shown the possibilities. In India, for example, the Apollo Telemedicine Networking Foundation operates more than 150 telemedicine centers that deliver primary, secondary, and tertiary levels of healthcare. From the consultation centers, X-rays, CT scans, and ultrasounds can be electronically transferred to experts for evaluation. Using remote diagnostics and

telemedicine, doctors can reach twice as many rural patients as they would through face-to-face consultations, increasing their job satisfaction and cutting down travel time for both doctors and patients.

The experience of mHealth so far has also demonstrated its effectiveness in combating diseases such as tuberculosis. With effective medication compliance, something technology will support, some 90 percent of those infected with TB could be cured. In South Africa the SIMpill system has achieved a 94 percent compliance rate for a TB trial, resulting in a 92 percent cure rate. SIMpill is a medication management system that detects non-compliance in real time and, when medication is missed, uses SMS messages to remind patients and carers. Similarly, in Thailand, phoned pill reminders have achieved dramatic improvements in the success rate of TB treatment, by leading to 90 percent compliance rate among patients (compared with a 22 to 60 percent compliance rate without the use of such systems).

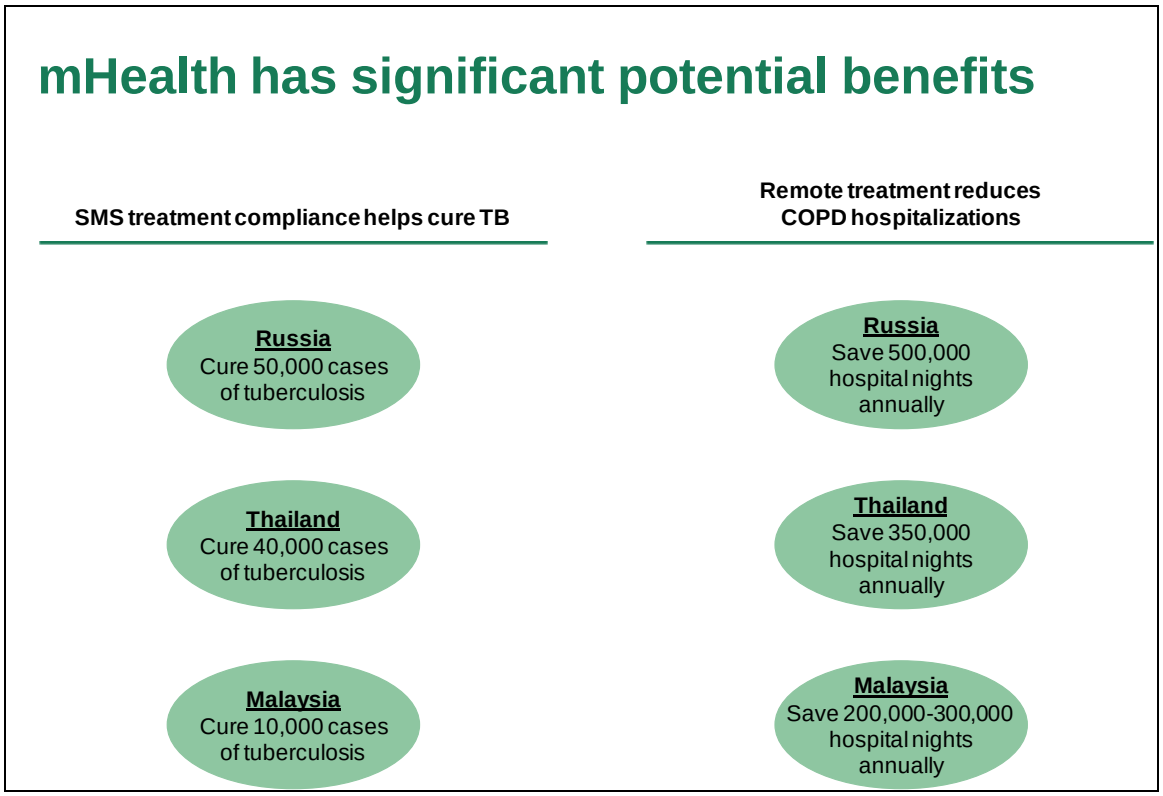
In Russia, where the WHO estimates that in 2008, 132 people per 100,000 were infected with TB, it is estimated that a full-scale mHealth rollout could cure 50,000 sufferers, helping the country exceed target number six in its Millennium Development Goals (a TB prevalence of 53 people per 100,000) by reducing prevalence to about 40 people per 100,000.

Remote care enhances treatment outcomes

For many diseases, the possibility of using remote monitoring techniques means mHealth could improve treatment for many patients. A patient suffering from a condition such as COPD, for example, could be discharged from the hospital and sent home to rehabilitate, freeing up another valuable hospital bed for someone with a more severe case.

Remote monitoring and video consultations could be conducted with specialists using devices such as a video-enabled smartphone or a “COPD briefcase” equipped with built-in video capabilities, monitoring sensors, and a connection to the patient’s hospital or health center.

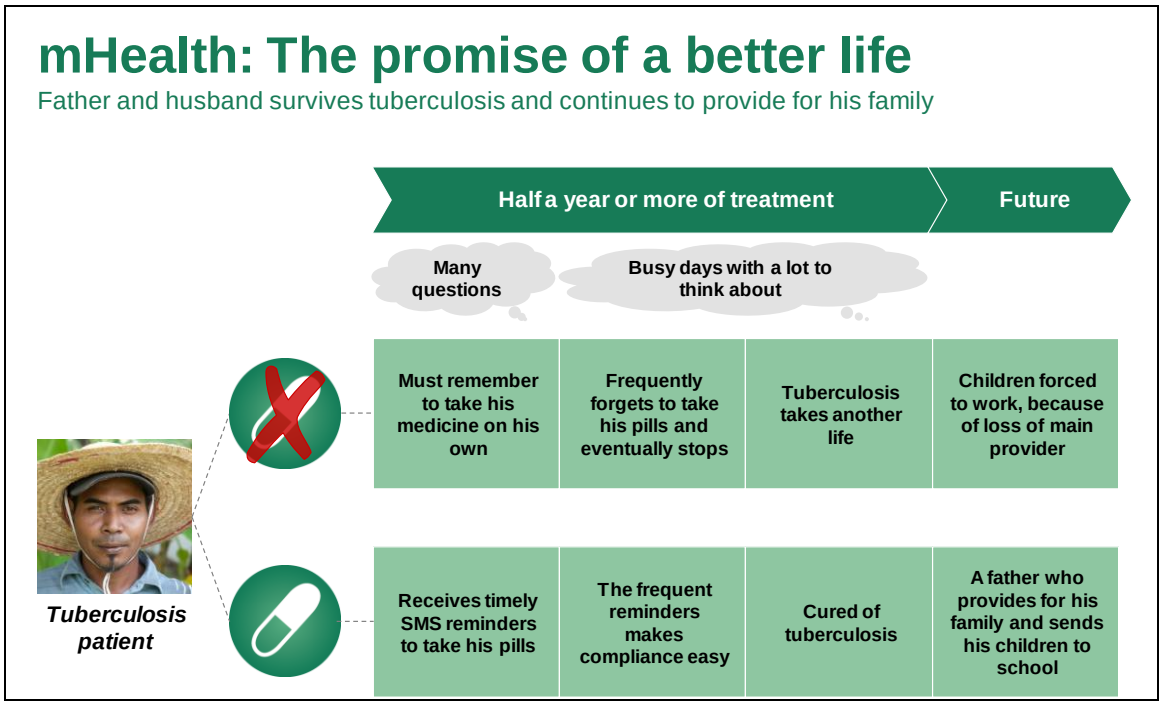
Trials have shown that a 50 to 60 percent reduction in hospital nights and re-hospitalizations can be made using such technologies. This has important implications for countries such as Thailand, where approximately 5 percent of the population has COPD and 10 percent of these individuals need annual rehabilitation treatment. Here mHealth could both save governments money and improve quality of care and outcomes for patients.



Healthy individuals contribute to productive populations

As the economies of transition countries grow and healthcare systems improve, infant mortality rates drop and life expectancy rises. This also leads to a rise in the number of younger individuals who can enter the workforce. At home, personal lives are improved and falling fertility rates create professional opportunities for women, increasing family incomes.

For transition countries, improved health leads to a more productive society—and healthier people possess greater physical and mental energy and are less frequently absent from work, saving companies money. Health also indirectly affects the intellectual capital of a nation, allowing people to take their education further and equipping them to better manage their own health and use healthcare facilities more effectively.



Take the example of a tuberculosis patient in Malaysia. As a husband and father, he needs to continue to provide for his family. He leads a busy life and has many questions about his condition. Without technology, he must make an effort to remember to take his pills. But he frequently forgets and eventually stops altogether. Without treatment, he dies, leaving the family without a provider and forcing his children to work to make up the difference.

With the assistance of a mobile phone, the same man receives timely SMS reminders to take his pills, making compliance with his medical treatment easy. As a result, he is cured of tuberculosis and can continue to provide for his family, earning enough money to send his children to school, helping foster a new generation of educated individuals who will be better equipped to manage their own health.

Making mHealth Happen

In Thailand, Malaysia, and Russia, a number of promising projects were identified.

Projects include the use of information tools by clinicians covering a wide range of health topics. In some countries, 24-hour health call centers have been established and staffed with skilled personnel. Elsewhere, there is the ability to electronically deliver information for mothers on good maternal health practices. In Thailand, phoned pill reminders are helping cure large numbers of TB sufferers, while in Malaysia, mobile telemedicine is extending the reach of healthcare and assisting clinicians make better-informed decisions.

Unfortunately, these projects are by no means representative of broader trends in healthcare or a significant rise in the adoption of mHealth. mHealth projects are struggling to reach scale in the Cluster B countries. Despite showing promising results, many are abandoned after the pilot stage, largely because they lack sustainable business models. And even though projects have the potential to serve millions of people, many report that they are serving far fewer.

New rules needed to shape mHealth landscape

When it comes to the regulatory environment, lack of common standards is a major barrier to the widespread deployment of mHealth. In the transition countries we studied, we found that, where standards exist, substantial variations exist between different providers—from companies to public sectors organizations, and from primary to secondary care.

Moreover, healthcare players have limited capacity to exchange data electronically. In Malaysia, a Lifetime Health Record project to integrate a range of information systems was planned, but has been postponed indefinitely. Malaysia needs to re-commit to projects such as this while paving the way for technical and data interoperability for future projects, ensuring that mHealth solutions are adequately covered in evolving legislation and policies.

In Thailand, meanwhile, a regulatory vacuum is creating disincentives to investment in mHealth. And while the country has established legislation to protect the privacy of personally identifiable data, no specific legislation has been formulated on digital health-related data, nor do any rules cover the sharing of and access to health data via electronic health records.

To help develop appropriate guidelines for electronic data exchange and to ensure data protection laws meet the needs of an mHealth rollout, Thailand needs to look to similar types of legislation in other countries and to bring together stakeholders such as the Ministry of Health, patients, and a range of healthcare providers.

Addressing the future of healthcare is critical for Thailand, Malaysia, and Russia. While all three countries are making progress toward eradicating the communicable diseases and life-threatening illnesses that are prevalent in developing countries, these diseases still represent a sizeable chunk of their healthcare burdens. Meanwhile, as their economies grow, they are facing new challenges—notably in the rise in lifestyle-related diseases, a growth in the proportion of the elderly population, and the rising costs of healthcare services. Mechanisms must be found to deliver healthcare to under-served communities while also providing affordable health services to the growing number of people in need of long-term care.

Cluster C: Bangladesh, Pakistan, and India

Key Health Challenges

In Bangladesh, Pakistan, and India, our Cluster C countries, national healthcare systems are still struggling to deliver affordable access to healthcare to all of their citizens. With limited resources and much of the population living in remote rural areas, mHealth has the potential to revolutionize the delivery of healthcare in these countries.

Despite the potential they hold, mHealth deployments are currently limited in scale in these countries. Urgent action is therefore needed to break down barriers to the widespread adoption of mobile technology in healthcare. These barriers include regulatory hurdles, in particular clarifying the legislative environment relating to health data privacy and security and personal identity regulations. Moreover, common technical standards need to be adopted to facilitate the exchange of data, as well as shared knowledge and experience.

Most urgent, however, is the need to increase knowledge and awareness of the potential impact of mHealth among healthcare organizations, patients, and other stakeholders. In this respect, telecommunications companies have a critical role to play, helping scale up current initiatives and acting as facilitators in the coordination of efforts from both the public and private sectors.

The question for policymakers is how to harness the power of the telecoms and to engage them and other stakeholders in coordinated efforts to turn mHealth from a small but promising experiment into a national healthcare solution.

Health challenges persist

The range of health challenges varies from country to country. However, Bangladesh, Pakistan, and India all broadly share difficulties in lowering the rates of infant and child mortality and improving maternal health and family planning.

Communicable diseases also remain among the leading causes of death in these countries, despite the attention being paid to them by individual governments and the focus on combating these diseases in the United Nations Millennium Development Goals, which include Goal 4 (to reduce child mortality), Goal 5 (to improve maternal health), and Goal 6 (to combat HIV/AIDS, malaria, and other diseases). Non-communicable diseases are also increasing worldwide.

Meanwhile, Bangladesh, Pakistan, and India lack sufficient numbers of skilled healthcare workers—physicians, nurses, and specialists—to serve their populations.

This situation has been exacerbated by the migration of healthcare workers over the past three decades to mature markets.

Access to healthcare remains highly dependent on income, status, and geography, with striking gaps between availability in large urban centers and that of remote rural areas. For governments in all three countries, the overall cost of operating the healthcare system is a limiting factor to the effective care of the population.

Fortunately, widespread adoption of mHealth requires relatively low investment, since the necessary infrastructure is already in the hands of millions of citizens. Bangladesh, Pakistan, and India are rapidly growing markets for mobile services. Meanwhile, increasing bandwidth is enabling more complex services to be delivered to mobile devices, particularly as the adoption of smartphones increases.

In the process, patients are receiving and sharing more health information and are becoming more adept at managing their own healthcare. And as a result, they are playing a more active role in the prevention and treatment of illnesses.

As governments in these countries look to lift their citizens out of poverty and lay the foundations for a more equitable society, healthcare is a critical challenge—one mobile technology is eminently well-suited to address.

In assessing the health systems of the Cluster C nations of Bangladesh, Pakistan, and India, we found that these countries face similar challenges. Maternal and child health and communicable diseases are the most pressing medical problems in all three countries. With the Cluster C countries struggling to deliver adequate healthcare coverage and sufficient access to their citizens, mHealth will be critical if they are successfully to manage their healthcare burdens. In Bangladesh, for instance, without mHealth, the government's ambition of achieving an average life expectancy of 70 years by 2021 may not be reached; based on GDP growth predictions, life expectancy is currently only projected to reach 69 years by that date.

Many of the health policy priorities of these countries look similar. Goals adopted by all three national governments include combating malnutrition (the Pakistani administration has even made this part of its ambitious 2015 goals, with a target of preventing an additional 5 million children from becoming malnourished), as well as reducing the rates of child and maternal mortality.

All three governments are keenly focused on reducing or eradicating disease. By 2015, Pakistan aims to have eradicated polio, measles, and tetanus; averted 13 million new tuberculosis cases; and immunized more than 22 million children against Hepatitis B and other diseases that are preventable by vaccination.

However, variations in emphasis are also evident among the national policies of the Cluster C countries. In Bangladesh, for instance, the strongest focus is on increasing health coverage and access. Its goals include making basic medical utilities and health services available for people at every strata of society, particularly poor communities in rural and urban areas. The Bangladeshi government also aims to

improve nutrition levels among its citizenry and increase the quality, acceptance, and availability of primary healthcare and governmental medical services.

For India, too, giving under-served populations and marginalized group access to healthcare is among the articulated goals. However, an additional health-related priority is to bring about a reduction in the rate of population growth and ultimately to achieve population stability. India has also prioritized training and skills development in order to ensure adequate human resources—medical, paramedical, and managerial—for the health sector.

Meanwhile, Pakistan is looking to strategically shore up its overall service provision by strengthening stewardship functions in the healthcare sector to ensure reliable service provision, equitable financing, and accountability. It also aims to increase evidence-based policymaking and strategic planning in the health sector.

For all three countries, mHealth solutions have the potential to help governments achieve their goals. Five areas show the most promise in this respect: public information and education; healthcare worker education and information; public health surveillance and data collection; diagnostic and treatment support; and patient monitoring and compliance with medical regimes.

However, factors such as shifting demographics, continued globalization, and migration patterns may mean that governments in developing countries are forced to adjust their priorities.

Shifting demographics bring new challenges

In particular, demographic changes will prompt a reevaluation of healthcare strategies by many policymakers. For a start, developing countries are aging at rapid rate. According to the U.S. Census Bureau, the most rapid increases in populations of 65 years and older are taking place in developing countries, which will experience a sharp rise in that age group of 140 percent by 2030.
This rapid demographic shift has important implications for countries such as Bangladesh, Pakistan, and India. As their populations age and live longer, the demand for treatment of non-communicable diseases will increase. Longevity brings with it the illness—such as heart disease, dementia, arthritis, and diabetes—of ageing that are more complex and expensive to treat.

The need to provide palliative care will also rise up the agenda. Yet many developing countries have woefully poor palliative care facilities. A 2009 Human Rights Watch study on India, for instance, reported that lack of access to the basic pain relief provided by morphine meant hundreds of thousands of Indians with cancer and other conditions were needlessly suffering long and agonizing deaths.

An aging population creates economic challenges, too, resulting in decreases in the ratio of both working people to the elderly population and of active healthcare professionals to potential patients. As the older population expands, it also leads to a reduction in the number of people funding healthcare, putting further pressure on

government budgets.

Socio-economic Impact of mHealth

When we looked at the potential for mobile technology to improve the health and welfare of the citizens of Bangladesh, Pakistan, and India, we found some striking predictions. Life expectancy could be raised significantly as a result of reduced perinatal and maternal mortality if mHealth was to be widely deployed, for example. This could result in two years being added to the average life expectancy in India and Bangladesh and three years in Pakistan.

In countries where few births are attended by skilled personnel (49 percent in India and 39 percent in Pakistan and Bangladesh), mHealth could fill the gap, increasing the flow of information to pregnant women through SMS campaigns and providing prenatal advice at every stage of their gestation. In Bangladesh, for example, the Ministry of Health and Family Welfare has initiated a project to increase health awareness in this way.

Moreover, mobile-assisted education and awareness raising become even more powerful tools when delivered to traditional birth attendants. Evidence shows that education and increased referral can reduce perinatal and maternal mortality by 30 percent. In regional trials in Pakistan, for example, maternal mortality was found to be cut by 26 percent though the use of mHealth education and information dissemination.

When it comes to communicable diseases, the projections for mHealth-driven improvements are equally striking. Part of the reason is that for a disease such as tuberculosis, contact from frontline workers is critical in minimizing the risk of the disease being spread by those infected and in ensuring that patients complete their treatment and manage the side effects of the drugs they are taking.

In the absence of sufficient numbers of frontline healthcare workers, mobile phones play a critical role as a supplementary support system. Evidence shows that SMS-based reminders can improve patients' drug compliance by between 30 and 70 percent—and when it comes to tuberculosis, 90 percent of those infected can be cured with proper medication compliance. If untreated, the death rate for active TB sufferers is more than 50 percent).

As a result, by 2025, use of mobile healthcare techniques could lead to the cure of 250,000 tuberculosis sufferers in Bangladesh, with this figure rising even higher, to some 1.1 million, in India and Pakistan.

Taking healthcare "the last mile"

For countries such as Bangladesh, India, and Pakistan, taking healthcare "the last mile" is a particular challenge, since many citizens live in remote rural areas. Here, mobile technology provides a compelling solution, since it can connect local health

workers and patients with large hospitals and health centers to deliver remote diagnostics and telemedicine. Diagnostic procedures such as X-rays, CT scans, and ultrasounds can be taken locally but transferred electronically to specialists for assessment. In India, for example, 115 consulting centers across the country have performed 69,000 patient consultations.

This dramatically increases the number of patients reached. WHO estimates that in rural areas doctors using mobile technology can double the number of patients served. This not only saves costs and valuable time on the part of doctors, patients no longer have to incur the personal costs—both in money and time—of traveling long distances to reach a health expert.

The possibility of making remote diagnostics also contributes to reduced hospital costs. In Bangladesh, these savings could amount to $1 billion a year (or 5 percent of 2025 expenditure), in India the sum could be $7 billion (2 percent of 2025 expenditure), while in Pakistan savings are estimated at $1 billion (4 percent of 2025 expenditure).

Breaking this down, this assumes that there would be a 30 percent reduction in hospital referrals (with an average annual developing country cost of $30 per hospital bed per night) and that 25 percent of the rural population would receive diagnoses through telemedicine.

Enhancing data collection

If mobile phones can be tools for remote diagnostics, they also allow patients and healthcare providers to access health records remotely, speeding up processes, avoiding duplication, and saving between 20 and 30 percent in administrative costs.

In Bangladesh, where there is a lack of coordination between different departments under the Ministry of Health and Family Welfare, accessing electronic records remotely could eradicate bureaucratic inefficiencies.

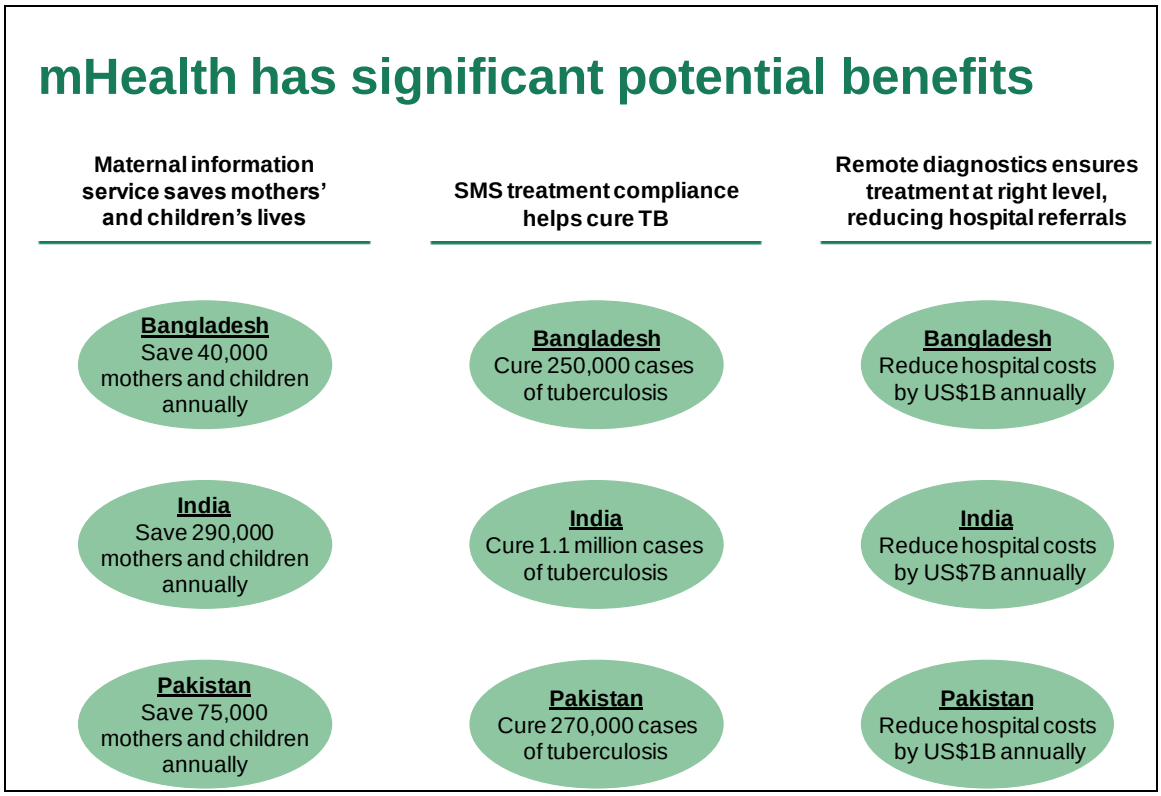
While mobile medication management systems address healthcare challenges at the micro-level, mobile technology can also boost significantly the efficiency of national health data collection. In some cases, no health data collection takes place at all. WHO estimates that in priority areas, areas for which health statistics are available can be as low as 40 percent. Meanwhile, where data is collected in developing countries, the process is often highly inefficient and time consuming, resulting in inaccuracies in the data and long periods of time between the collection of information and its analysis by health authorities.

This is a particular cause for concern, given the likelihood of outbreaks of diseases such as the H1N1 influenza outbreak. In such situations, the need for a centralized approach and a real-time picture of the spread of the disease is critical.

Even in the absence of an outbreak of disease, it is important for governments to be able to gain a clear picture of the health status of their citizens. In this respect,

mobile devices deliver dramatic improvements in the efficiency and accuracy of data collection, providing a real-time picture of levels of health across a region or nation and eliminating many of the errors generated when this information is gathered by people equipped with little more than a paper and pen.

Electronic data collection results in greater job satisfaction among workers and saves health authorities money. At least 24 percent can be achieved in cost reduction. However, some have reported even higher savings. In a pilot project in Guatemala in 2010, use of EpiSurveyor—a mobile data collection tool funded by the United Nations Foundation, the Vodafone Foundation, and a World Bank Development Marketplace Grant—not only resulted in drastically increased speed and accuracy:compared to the 2009 paper-based survey, the mobile-phone-based equivalent cut the average cost of data collection and digitization by some 71 percent.



Lower costs, longer lives, stronger economies

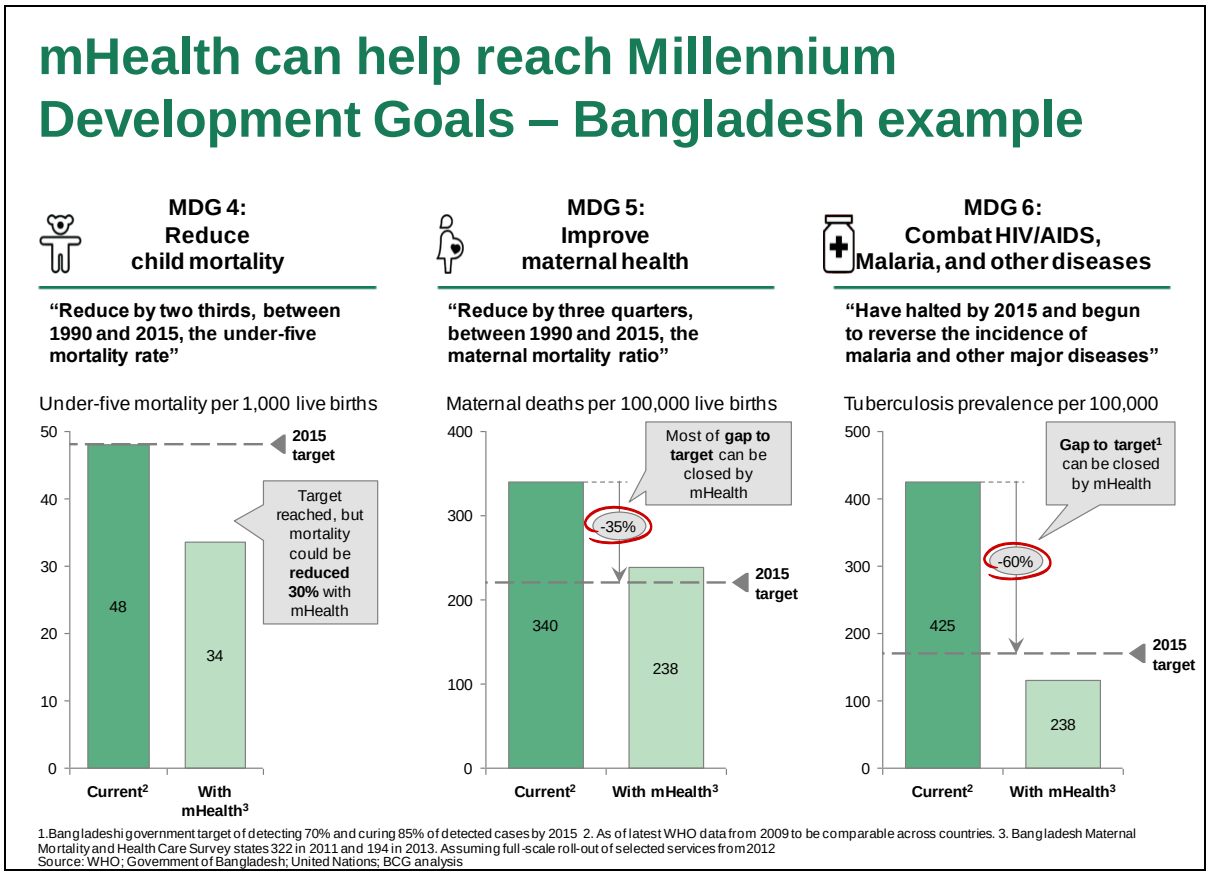
When these kinds of cost savings can be achieved, governments have more money to spend on other things. Moreover, having healthier populations as a result of mHealth interventions generates more than cost savings for governments. A healthy population in which citizens live longer is a more productive one, so in effect, mHealth helps generate economic growth.

There is a demographic element to this as well, since improved health reduces infant mortality rates and lengthens life. While in the short term this means an increase in the number of younger and older people, in the long term it means that a greater proportion of the population is at a productive working age, increasing a society's income—something that is critical as countries experience a rise in older, more dependent, populations.

In Bangladesh and India, a two-year increase in life expectancy would increase annual GDP approximately 1 percent by 2025. In Pakistan, a three-year increase in life expectancy would achieve the same GDP growth.

Take the case of an expectant mother in a rural area. She may have no doctors nearby to ask appropriate questions when health issues arise, and if she fails to understand the warning signs the result could be the death of both mother and child. If she were able to receive timely information on maternal health via a mobile phone, she could learn how to recognize any danger signs and remotely seek help. In short, she is equipped to make decisions that may ultimately prove life saving.

Such improvements in health outcomes have an impact on more than individual lives. Spread across a nation, they would also help countries such as Bangladesh, Pakistan, and India to achieve several of the Millennium Development Goals by reducing child mortality; improving maternal health; and combating HIV/AIDS, malaria, and other diseases.



Making mHealth Happen

In the three Cluster C countries we studied, we found many mHealth programs in place. However, much more needs to happen before these programs can start to make a significant difference to the health of their populations and contribute to improved socioeconomic prospects.

A promising start has certainly been made in these countries. In Pakistan, HealthLine, an automated health information and education service, can be used by illiterate community health workers. Workers can call at any time, free of charge, from a mobile phone or landline and talk to the system in their own language to ask questions and learn about symptoms and treatments.

Among the eight data collection projects launched in Bangladesh, Medic Mobile allows community workers to use a range of existing open-source platforms and mobile devices to use text messages, emails, and Twitter direct messages to collect and collate health data in the field.

In India, projects include Piramal E-swasthya, which gives local literate women living in villages without doctors training in collecting simple diagnostic data, preventive medicine and first-aid, and customer service. Armed with a medical kit, marketing material, and a mobile phone, they set up a tele-clinic in their homes. During patient visits they are connected with a call center and enter the information into a simple e-diagnosis system, generating an automated response with a recommended prescription and treatment (validated by doctors at the call center). If the illness appears serious, the patient can be transferred to another center. For a low cost, the system gives thousands more Indians access to high-quality healthcare.[1]

Access and common standards key challenges

For all three of the countries we studied, increasing access to mobile services, especially among vulnerable groups, is seen as one of the biggest challenges. Distant rural areas lack both healthcare services and mobile network coverage. Linguistic diversity presents yet another challenge when it comes to mobile dissemination of health information.

This will demand innovation in finding ways to stimulate affordability and increase demand, thereby extending healthcare access to the most vulnerable citizens. In this effort, it will be critical to work in partnership with the private sector and to provide the stable and supportive regulatory landscape that will stimulate corporate investment.

With lack of interoperability a key barrier to mHealth adoption, all three countries have also recognized the need to commit to common technical standards. Yet despite having established eGovernment systems, none has developed a similar policy toward health that could help drive forward standardization.

Some efforts have been made to address this. In India, for instance, the Ministry of IT and the Ministry of Health and Family Welfare have created task forces to develop standardization guidelines. India has also put in place a National eHealth Policy. However, its implementation varies between different actors.

Governments therefore need to establish national eHealth policies that not only focus on extending mHealth coverage but that also can be followed by a range of different authorities and NGOs. In partnership with industry players, they need to develop standardization guidelines and to align those with international efforts.

For Pakistan, establishing a centralized database linking individuals and professionals to health data is seen as critical to progress. However, the country recent devolved responsibility for health from federal to provincial, creating uncertainty as the new structure settles in. The government therefore needs to gain agreement among the provinces on a common architecture before nationwide benefits can be realized.

For Bangladesh, in addition to focusing on increased access and commitment to common standards, the government is keen to establish regulatory clarity in the area of health data privacy and security. In this respect, while the country is experiencing increased uptake of services, it is currently facing a regulatory vacuum with unresolved questions hanging over issues of protection of patient data privacy.

It will therefore be critical for Bangladesh's policymakers to engage key stakeholders such as the Ministry of Health and Family Welfare, healthcare providers, and patients in developing robust guidelines and personal data protection laws that are aligned with the needs of a national mHealth rollout.

Careful thought will also need to be put into how to create incentives that encourage a range of stakeholders to engage in the development of mHealth. Currently, those incentives are lacking. For example, with the current payment structure, there is little incentive to move to more remote diagnostics and treatment when remuneration is based on the number of nights patients spend in hospital. And with government management of healthcare fragmented, it is hard to find one administrative body to take responsibility for pushing forward mHealth solutions.

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Bangladesh Bureau of Statistics: http://www.bbs.gov.bd

Bangladesh Ministry of Health and Family Welfare: http://www.mohfw.gov.bd/index.php?option=com_content&view=article&id=74&Itemid=92&lang=en

Carnegie Mellon University: http://www.cs.cmu.edu/~healthline/

CGAP: http://www.cgap.org

Economic Planning Unit of Malaysia: http://www.epu.gov.my

Economist Intelligence Unit: http://www.eiu.com

eHealth Association of Pakistan: http://www.ehap.net.pk/

eHEALTH Magazine: http://ehealth.eletsonline.com/

E-health Strategies Database: http://ehealth-strategies.eu/database/database.html

Euromonitor: http://www.euromonitor.com

European Agency for Reconstruction: www.ear.europa.eu

Eurostat database: http://epp.eurostat.ec.europa./portal/page/portal/eurostat/home/

FHI 360 Satellife: http://www.healthnet.org/

GSM Association: http://www.gsmworld.com

GSM Association Mobile Health Live Deployment Tracker: http://apps.wirelessintelligence.com/health/tracker/

HUB: HealthUnBound: www.healthunbound.org

Indian Ministry of Statistics and Programme Implementation: http://mospi.nic.in

International Finance Corporation: http://www.ifc.org/

International Monetary Fund: http://www.imf.org

International Telecommunications Union: http://www.itu.int

Medisat: http://www.medisat.dk

mHealth Alliance: www.mhealthalliance.org

Mina Vårdkontakter: http://www.minavardkontakter.se

MyHealth Malaysia: http://www.myhealth.gov.my

Medic Mobile: http://medicmobile.org

Norwegian Directorate of Health: http://www.helsedirektoratet.no

Norwegian Directorate of Health - ISF data: http://cognos.shdir.no/cognos/cgi-bin/ppdscgi.exe

Norwegian National Budget: http://www.statsbudsjettet.no

Norwegian Ministry of Health and Care services: http://www.regjeringen.no/nb/dep/hod.html

OECD Health database: www.oecd.org/health/healthdata

Piramal: www.piramal.com

Statistics Division, Government of Pakistan: http://www.statpak.gov.pk

Statistics Norway (SSB): http://www.ssb.no

Statistics Sweden (SCB): http://www.scb.se

Statistical Office of the Republic of Serbia: http://webrzs.stat.gov.rs/WebSite/

Statistics Malaysia: http://www.statistics.gov.my

Swedish Government: http://www.regjeringen.se

Swedish National Institute of Public Health: http://www.fhi.se/en/

Swedish Ministry of Health and Social Affairs: http://www.sweden.gov.se/sb/d/2061

Telecom Regulatory Authority of India: http://www.trai.gov.in

United Nations Development Program: http://www.undp.org/

UNDP MDG Monitor: http://www.mdgmonitor.org/

United Nations Foundation: www.unfoundation.org

Wireless Intelligence mHealth Deployment Tracker:
http://apps.wirelessintelligence.com/health/tracker/

World Bank Database: http://data.worldbank.org/

World Health Organization: http://www.who.int

World Health Organization Data Repository: http://apps.who.int/ghodata/

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