

The Promise of Mobile Health

Connecting people, compressing time and creating opportunities

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Key messages

- > Over the past decade, a mobile phone “revolution” has occurred, connecting populations across the most remote and rural parts of the globe.
- > The reality of ubiquitous connectivity, at relatively low cost, has spurred an associated explosion of innovations in public services optimization, from health care and nutrition to agriculture extension support.
- > mHealth solutions, for example, target health system gaps to deliver incremental gains or, in some instances, completely overcome barriers hindering widespread population coverage of interventions of known efficacy.

The mobile revolution

In these final months leading to the 2015 Millennium Development Goal deadline, we find ourselves redoubling efforts to reach the UN targets set in September 2000. Over the past decade, these shared goals have galvanized the global community, across national boundaries and political agendas, to strive for certain universal targets – from dramatically reducing global poverty and improving equitable access to education to achieving substantial reductions in infant, child and maternal mortality.

As of March 2015, these ambitions are further challenged by a global population that exceeds 7.2 billion, putting further pressure on efforts to reduce inequities. These challenges start

at the very beginning of life (providing a clean and safe birth, attended by competent care-providers) through childhood (ensuring timely vaccination against major causes of death) into adolescence (providing education and access to adequate nutrition that prepares young men and women for a productive future). Into adulthood, these encompass access to employment, appropriate financial remuneration, competent and affordable healthcare, access to quality nutrition, and protection from disease.

The “bottom billion”

With a denominator of over 7 billion, it is not difficult to rationalize why inequities in health, education or nutritional equity persist and why national or global institutions struggle to deliver on their promises. Populations, rural and urban, socially or economically disenfranchised, where incomes continue to stagnate at less than US\$1.25 per day have been characterized as the “bottom billion” or the “ultra poor”.

One basic component linking these challenges is that of measurement – making every life count, irrespective of where a child is born or a pregnant woman dies. If these overt events remain difficult to enumerate, then one can only imagine the hurdles in quantifying the global burden of hidden hunger, a term used to describe invisible micronutrient deficiencies which contribute, in large part, to the morbidity, mortality and loss of productivity in billions of human beings around the world.

Measurement and equitable enumeration has remained a lofty, unattainable goal, largely blamed on a lack of reliable data systems and expensive research methodologies – until now. By the end of 2010, the International Telecommunication Union (ITU) estimated that over 90% of the world’s population lived within reach of a mobile phone network, with over 143 countries having access to high-speed Internet services. In 2013, this UN agency estimated that 6.8 billion mobile phone subscriptions reflected an 89% penetration in the developing world alone. By the end of 2014, this number has been revised to 95.5%, a 6% expansion in one year alone (see [Figure 1](#)).



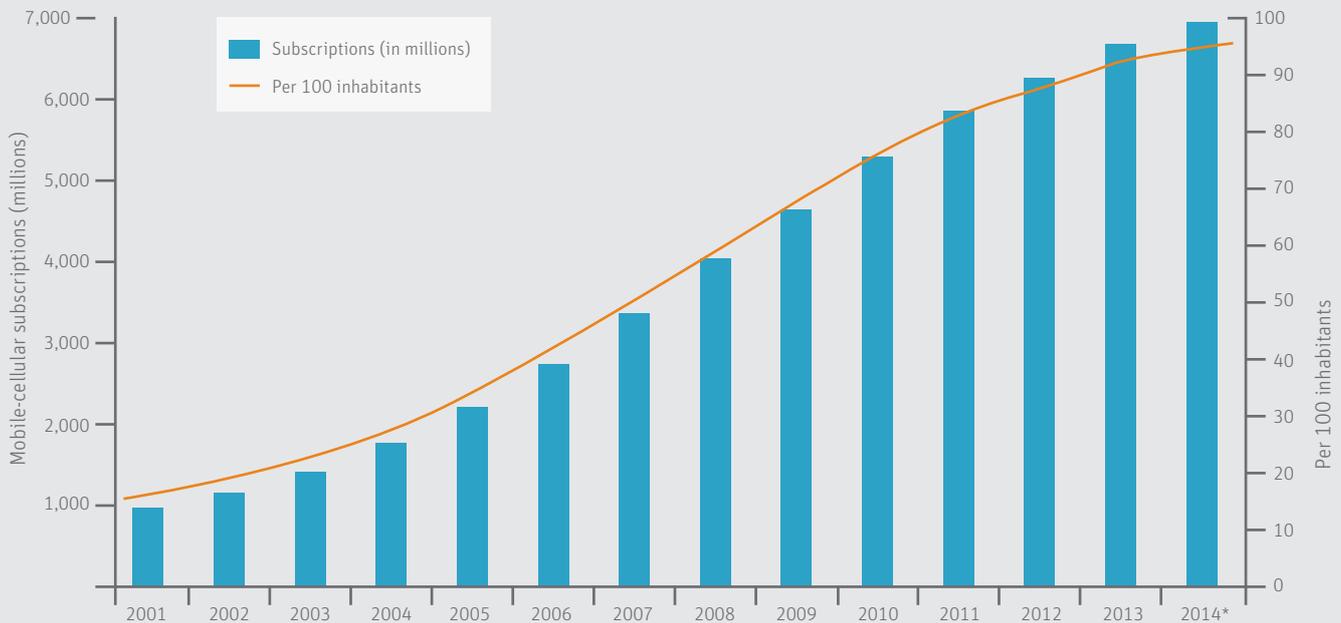
Husband and wife in rural Gaibandha, Bangladesh, hold up their own mobile phones, in a population which has reached over 100% national mobile connectivity coverage

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A sea change in global development

This rapid, market-driven technological revolution has spawned a sea change in global development. Initially, organizations like

the Grameen Bank in Bangladesh capitalized on mobile technology as an innovative small-enterprise solution for landless women to provide connectivity to their villages. These business models are rapidly becoming obsolete as mobile penetration increases and access to phones becomes ubiquitous. In the past decade, entirely new fields of research and implementation science have emerged, prefaced by an ‘m’, representing the novel ‘mobile’ facet of their approach: mHealth, mBanking, mAgriculture, mLearning, mNutrition, and so on.

FIGURE 1: Global mobile-cellular subscriptions total and per 100 inhabitants, 2001–2014

Note: *Estimate

Source: ITU World Telecommunication/ICT Indicators database, 2015, (www.itu.int/en/ITU-D/Statistics/Documents/facts/ICTFactsFigures2014-e.pdf, accessed April 2015).

Connecting people to information systems

Mobile technologies are also rejuvenating the domain of telemedicine and electronic health (eHealth), which were previously largely “tethered” systems, focused on facility-based record-keeping, supply chain monitoring and, sometimes, decision-support. Mobile technologies serve to untether these systems from their facilities. They widen the reach and versatility of the eHealth infrastructure to support frontline health workers, where and when they need access to patient information, while also allowing them to contribute to the clinical record from the field.

Access to information has, for many years, also been reserved to the upper echelons of society – the privilege of the wealthy and educated. As the cost of connectivity continues to plummet, we are witnessing in many of our research sites in low-income settings a transformation in the ease with which families can connect to necessary information, sometimes simply by a phone call, when they need it most. Farmers call neighboring markets to identify the best price before selling their crops, whereas parents may call a clinical provider to ask about whether they should seek care at a facility for a child’s illness. In many countries, health and nutrition information services have been launched by governments and NGOs to provide periodic reminders by text message or recorded audio, especially during pregnancy and the

postpartum period. The Mobile Alliance for Maternal Action, or MAMA, is one such global initiative that has reached over a million subscribers in Bangladesh, and has transitioned to being a government-led national system in South Africa.

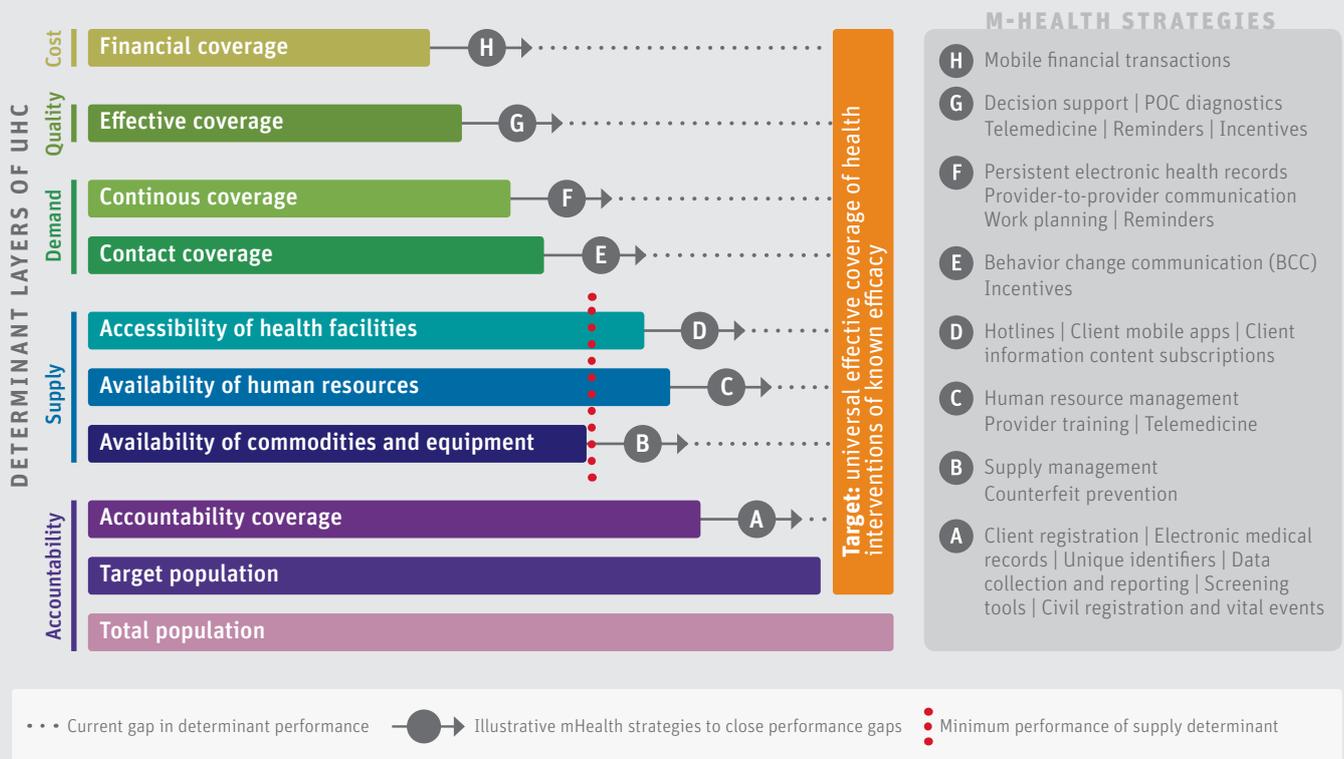
“We are witnessing a transformation in the ease with which families can connect to necessary information when they need it most”

The endgame: Absorption of mHealth into mainstream systems

This is, to many of us, the most exciting endgame for mobile health, or mHealth – a pragmatic and, increasingly, tested series of solutions to help us bridge the Last Mile, to accelerate progress towards the Millennium Development Goals (MDGs) by 2015 and the post-MDG agenda of universal health coverage (UHC).

Over the past five years, hundreds of pilot projects across the globe have tested mHealth strategies to increase the capacity of community health workers and improve the quality of

FIGURE 2: Cascading model to prioritize and select integrated mHealth strategies for achieving UHC



This framework shows how eight key ingredients are required before a target population (a subset of the total population at the bottom of the cascade) can all receive the quality, timely and adequate care they need. These components of health system performance are grouped into categories of accountability, supply, demand, quality and cost. As illustrated, each layer not only builds on the performance of the layer below it but also falls short

(dotted lines) of the optimal, desired level. A suite of mHealth strategies (labeled A through H) exists that could contribute to efforts in strengthening any given category. This framework helps facilitate dialogue between mHealth innovators and health system policy-makers to strategically plan how independently developed solutions can work an integrated approach to addressing health system challenges across numerous layers.

Credit: From Mehl G, Labrique A. Prioritizing integrated mHealth strategies for universal health coverage. *Science* 12 September 2014; 1284–1287 [DOI:10.1126/science.1258926]. Reprinted with permission from AAAS.

care received by the populations they serve. From this field of a “thousand flowers” of innovation, a healthy bouquet of solid enterprise solutions have emerged and are being used in countries at regional and national levels.

These systems enable tasks that were previously thought to be logistically impossible – enumeration of populations; registration of pregnancies, births and deaths; scheduling of antenatal, postpartum, and immunization visits with accountability for missed or delayed contacts; and providing at least a rudimentary health record. Importantly, these systems also provide a means to improve system efficiencies, from worker management to monitoring supply chains (including identifying counterfeit medications), as well as real-time monitoring and reporting of vital events and system performance. Most importantly, the most vital function of mobile phones, often lost in the whirlwind of innovation – voice communication – is a central, yet under-recognized, facet of the mHealth revolution, allowing workers to

access peer and supervisor guidance when and where they need it. We have argued, in a recent *Science* article, that mobile strategies may serve as important incremental contributors towards strengthening health systems’ post-MDG targets of achieving universal health coverage (Figure 2).¹

“The most vital function of mobile phones – voice communication – is a central facet of the mHealth revolution”

Connecting frontline workers to the systems they support
 Frontline health workers who are often the first and only point of care for most of the “bottom billion” and for the world’s rural

poor have been disconnected from the parent health systems they serve. Their isolation and often rudimentary training limited the capacity of this cadre to provide more than basic care, often disjointed from the broader health system within which they function. Mobile systems now exist to address gaps which, until recently, seemed intractable. Strategies such as BBC Media Action's "Mobile Academy" have provided continued skills development and training to frontline health workers, which integrate them as fully fledged members of their health systems. mHealth systems have empowered families with the information they need to maintain their health, and knowledge about the services they should expect from the government or health providers. Exciting strategies that bridge the worlds of mHealth and mFinance offer novel approaches to demand-side financing and performance-based incentive schemes.

In the footsteps of giants

In 2015, we find ourselves armed with a growing number of "enterprise grade" mHealth systems, with a rapidly expanding evidence-base for what mHealth works under various conditions. Mobile technologies continue to grow in sophistication and shrink in cost, providing fuel to several visions. We can imagine, in the not-too-distant future, a mobile phone being part of the core set of tools provided to every new community health worker, or a temporary phone, connected to essential down-

stream services and health information, being given to pregnant women as part of their antenatal services, just as a multivitamin supplement is made available. Through these visions, we build on the legacies established by public health giants John B Grant, whose work established the models for training China's "bare-foot doctors" in the 1960s and 1970s, and Carl Taylor, founder of the academic discipline of International Health and proponent of the vision that empowered communities and frontline health workers can shape their own futures. Without mHealth, these leaders changed the delivery of care to disconnected populations across the globe. Imagine what can be accomplished under a new paradigm of universal connectedness.

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