

I'D LIKE TO START WITH A DIAGRAM.



IT'S A BUNCH OF SHAPES CONNECTED BY LINES.



NOW I WILL SAY SOME IMPRESSIVE WORDS.



SYNCHRONIZED INCREMENTAL DIGITAL INTEGRATED DYNAMIC E-COMMERCE SPACE.



ANY QUESTIONS?



MAY I HAVE A COPY OF YOUR PRESENTATION?



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Growth and Paradigm Shifts in mHealth: Lessons learned and Opportunities

Alain B. Labrique, PhD, MHS, MS

Director, JHU Global mHealth Initiative

Chair, WHO mHealth Technical Evidence Review Group (*mTERG*)

&

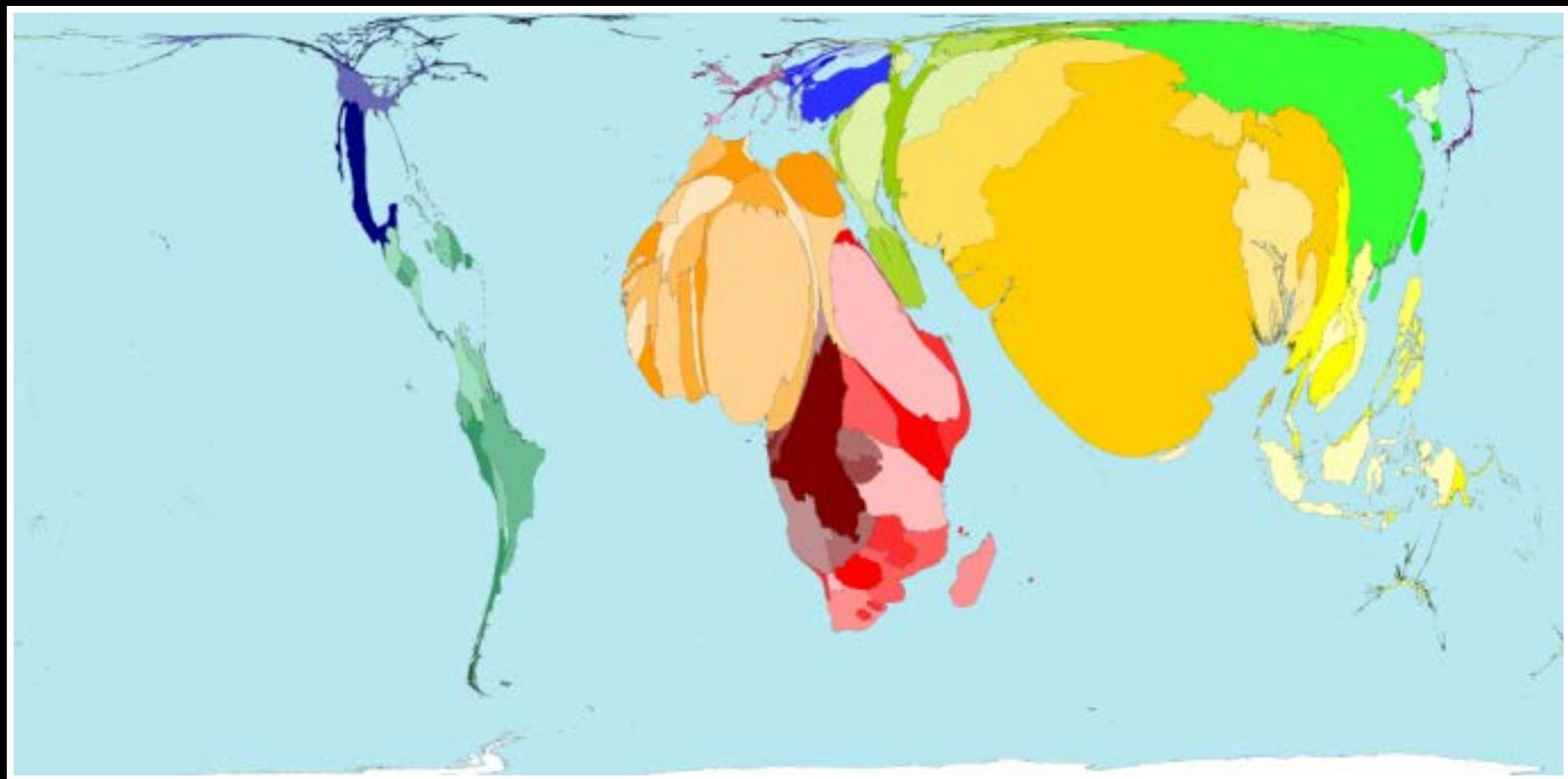
Associate Professor

Program in Global Disease Epidemiology and Control

Department of International Health &

Department of Epidemiology

Johns Hopkins Bloomberg School of Public Health



The World is Rapidly Changing



facebook

December 2010

**Euclidean map of 10 million of the 850 million
Facebook users friend networks**

© Paul Butler, FB

The World in

2013

ICT FACTS AND FIGURES

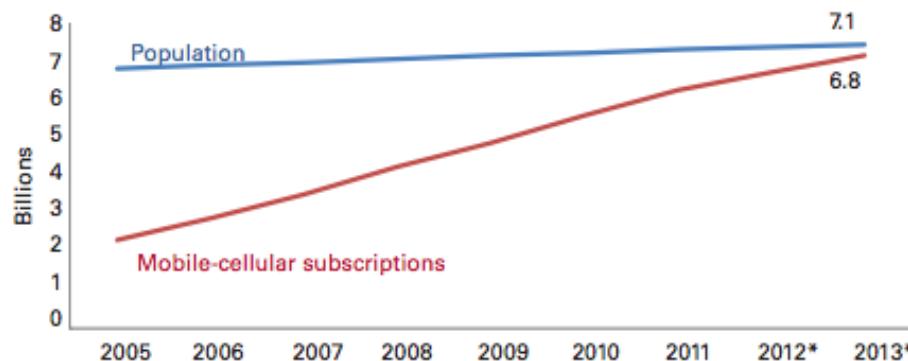


"I am pleased to present the latest ICT Facts and Figures which show continued and almost universal growth in ICT uptake. Every day we are moving closer to having almost as many mobile-cellular subscriptions as people on earth. This is exciting news. The mobile revolution is m-powering people in developing countries by delivering ICT applications in education, health, government, banking, environment and business. Let us all celebrate this mobile miracle that I have no doubt will hasten our pace towards sustainable development."

Brahima Sanou, Director of the ITU Telecommunication Development Bureau

6.8 BILLION MOBILE-CELLULAR SUBSCRIPTIONS

As the number of subscriptions approaches global population figures
mobile-cellular growth slows



Source: ITU World Telecommunication (ICT) Indicators database

Note: * Estimate

In 2013, there are almost as many mobile-cellular subscriptions as people in the world, with more than half in the Asia-Pacific region (3.5 billion out of 6.8 billion total subscriptions).

The African Digital Health
Systems Innovation Institute

@



JOHNS HOPKINS
UNIVERSITY

A large globe is positioned on the left side of the slide, composed entirely of binary digits (0s and 1s). To the right of the globe is a white rectangular box containing the institute's name and logos.

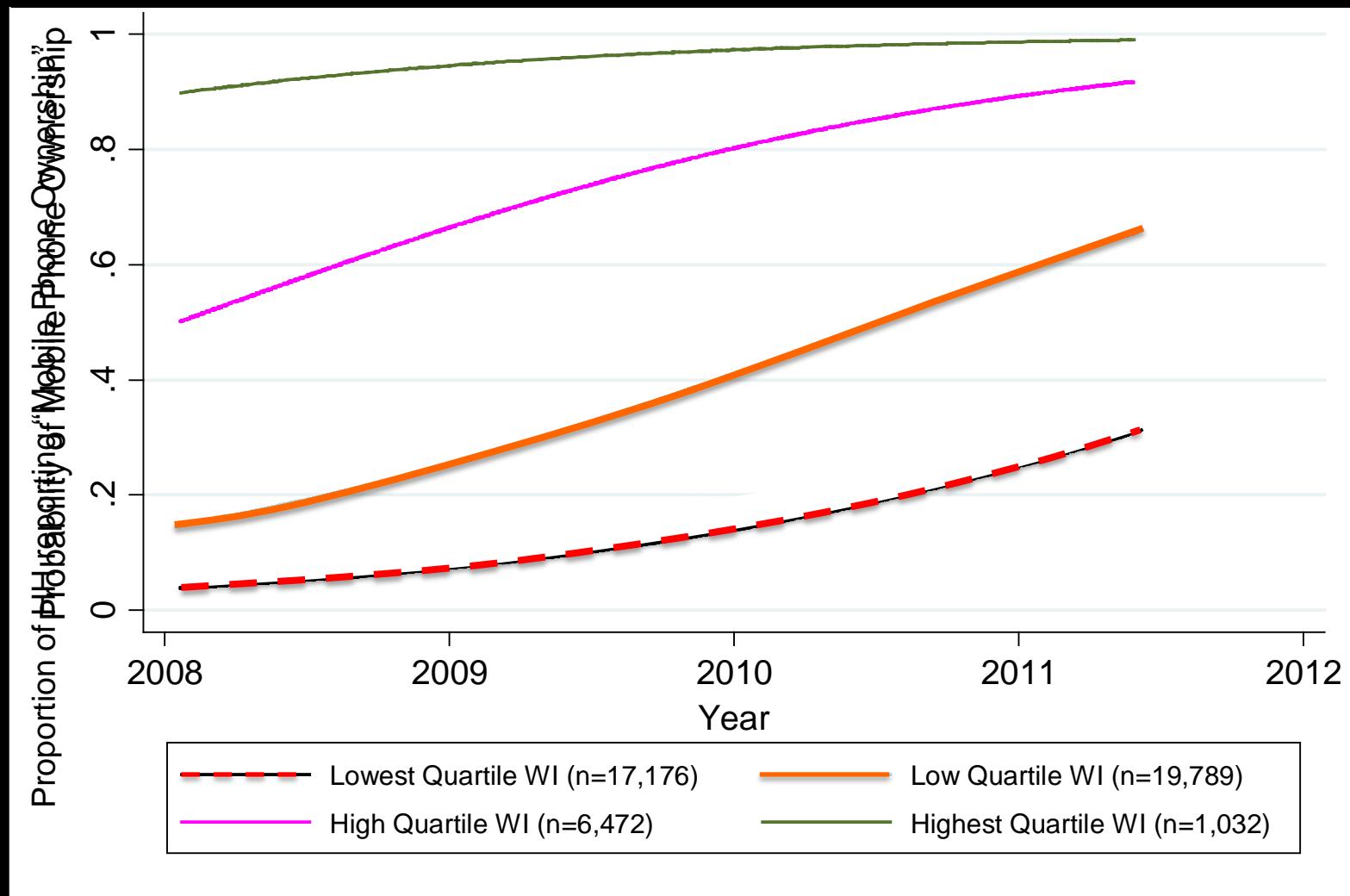
The African Digital Health
Systems Innovation Institute

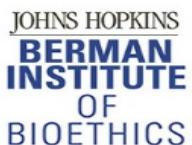
@

The Johns Hopkins University logo, which is a shield-shaped emblem featuring a book at the top, a globe in the center, and a checkered pattern at the bottom.

Mind the Gap!

Household Mobile Phone Ownership over time in rural Bangladesh, by “Wealth Index” (n=44,469)





JOHNS HOPKINS UNIVERSITY Global mHealth Initiative





www.jhumhealth.org

105 mHealth Projects at JHU, as of November 13, 2013



mHealth: The Five C's

Harnessing ubiquitous information and communication technology to **Collect** data, **Count** events, **Connect** individuals, **Compress** time and **Create** opportunities to improve health.



mHealth is not monolithic:

This impacts -- evaluation, indicators, business models, opportunities and strategies for scale.



Education and Awareness

Messaging in support of public health and behavioral change campaigns.



Diagnostic and Treatment Support

Mobile phones to support provider decisions and as a point-of-care device.



Disease and Epidemic Outbreak Tracking

Sending and receiving data on disease incidence, outbreaks and public health emergencies.



Supply Chain Management

Using mobile solution to improve stock-outs and combat counterfeiting.



Remote Data Collection

Collecting real-time patient data with mobile applications.



Remote Monitoring

Maintaining care giver appointments or ensuring medication regime adherence.



Healthcare Worker Communication and Training

Connecting health workers with sources of information.

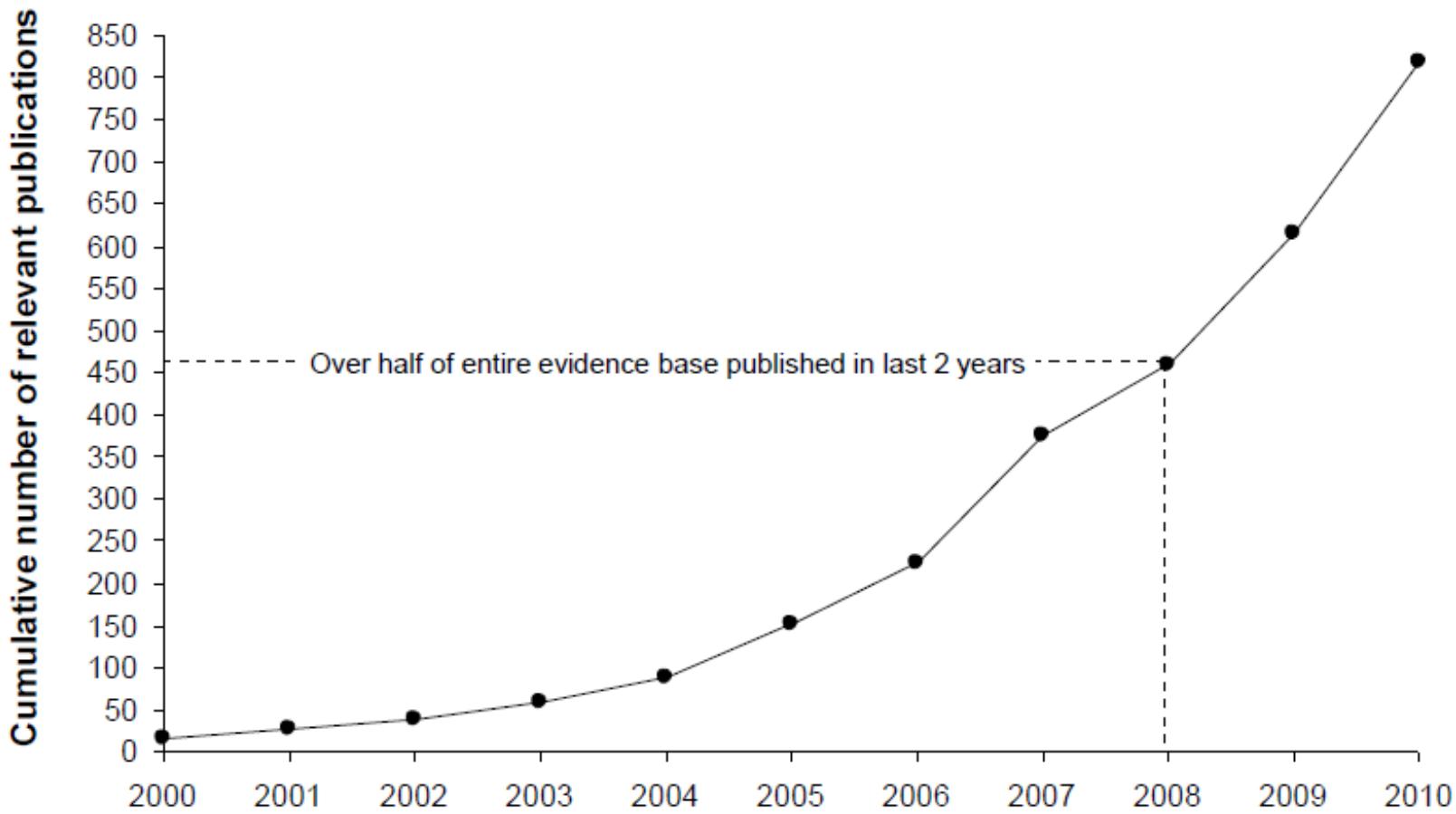


JOHNS HOPKINS UNIVERSITY
Global mHealth Initiative

mHealth doesn't work in a Vacuum

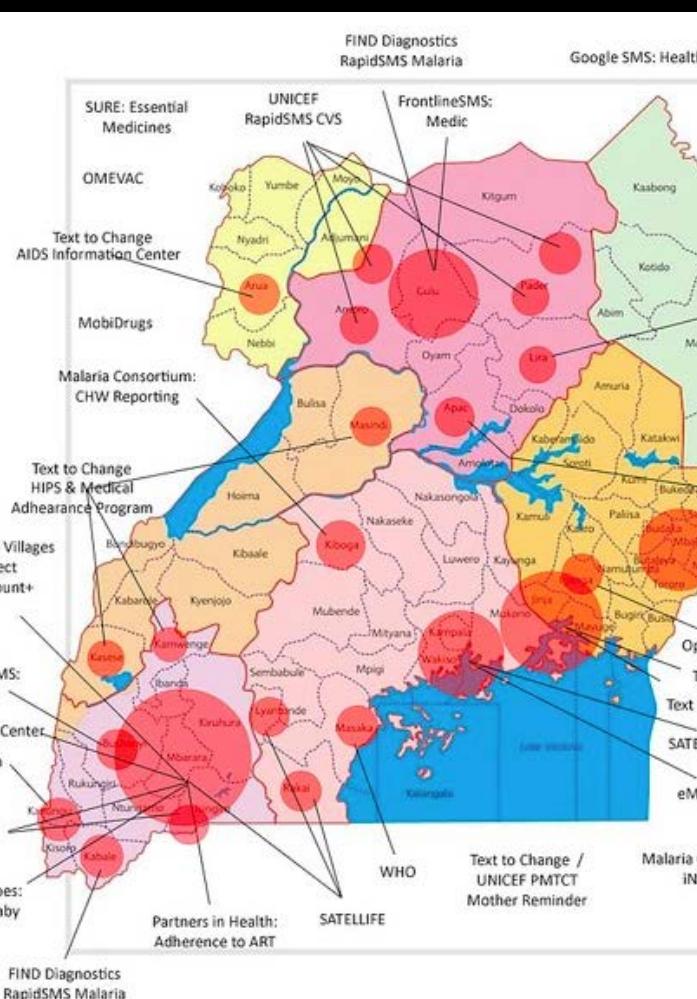


mHealth is an “Emergent” Field





Pilotitis



Telephone: General Line: 340874/231563/9
Permanent Secretary's Office: 256 - 41 - 340872
256 - 41 - 231584
Fax:
IN ANY CORRESPONDENCE ON THIS SUBJECT PLEASE QUOTE ADM. 45/273/01



Ministry of Health
P.O. Box 7272
Kampala
Uganda

THE REPUBLIC OF UGANDA

17th January, 2012

All Technical Programmes of MOH
All Hospital Directors
All District Health Officers
All Medical Superintendents
All key Stakeholders

RE: COORDINATION AND HARMONISATION OF EHEALTH INITIATIVES

Reference is made to the above subject.

The Ministry of Health recognizes the critical role of Information and Communication Technologies in improving the quality of health care, enhancement of human resource development, use of evidence based decision making and ultimately the attainment of the Millennium Development Goals.

While the potential advantages of ICT for development are enormous, we need to put in place an enabling environment guided by a clear eHealth Policy and Strategic Framework.

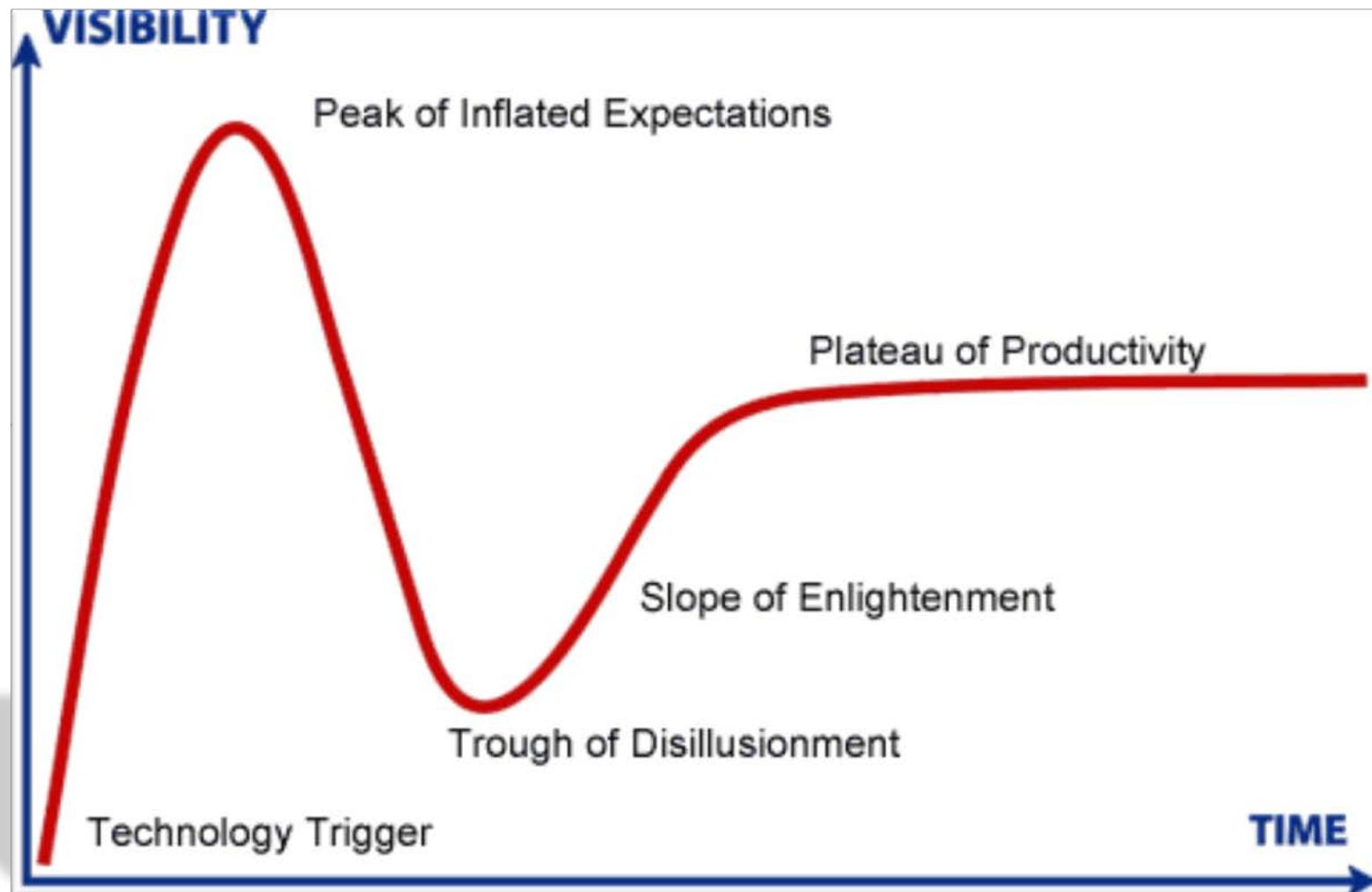
In order to jointly ensure that all eHealth efforts are harmonized and coordinated, I am directing that ALL eHealth projects/Initiatives be put to halt until:

- a. Approval is sought from my Office
- b. Sustainability mechanisms and Ownership have been agreed upon
- c. Interoperability with the National DHIS2 has been achieved
- d. Institutional Structures are utilized
- e. eHealth TWG has reviewed and recommended its Approval

This directive takes immediate effect.

Dr Jane Ruth Aceng
DIRECTOR GENERAL HEALTH SERVICES
Cc Ag. Permanent Secretary

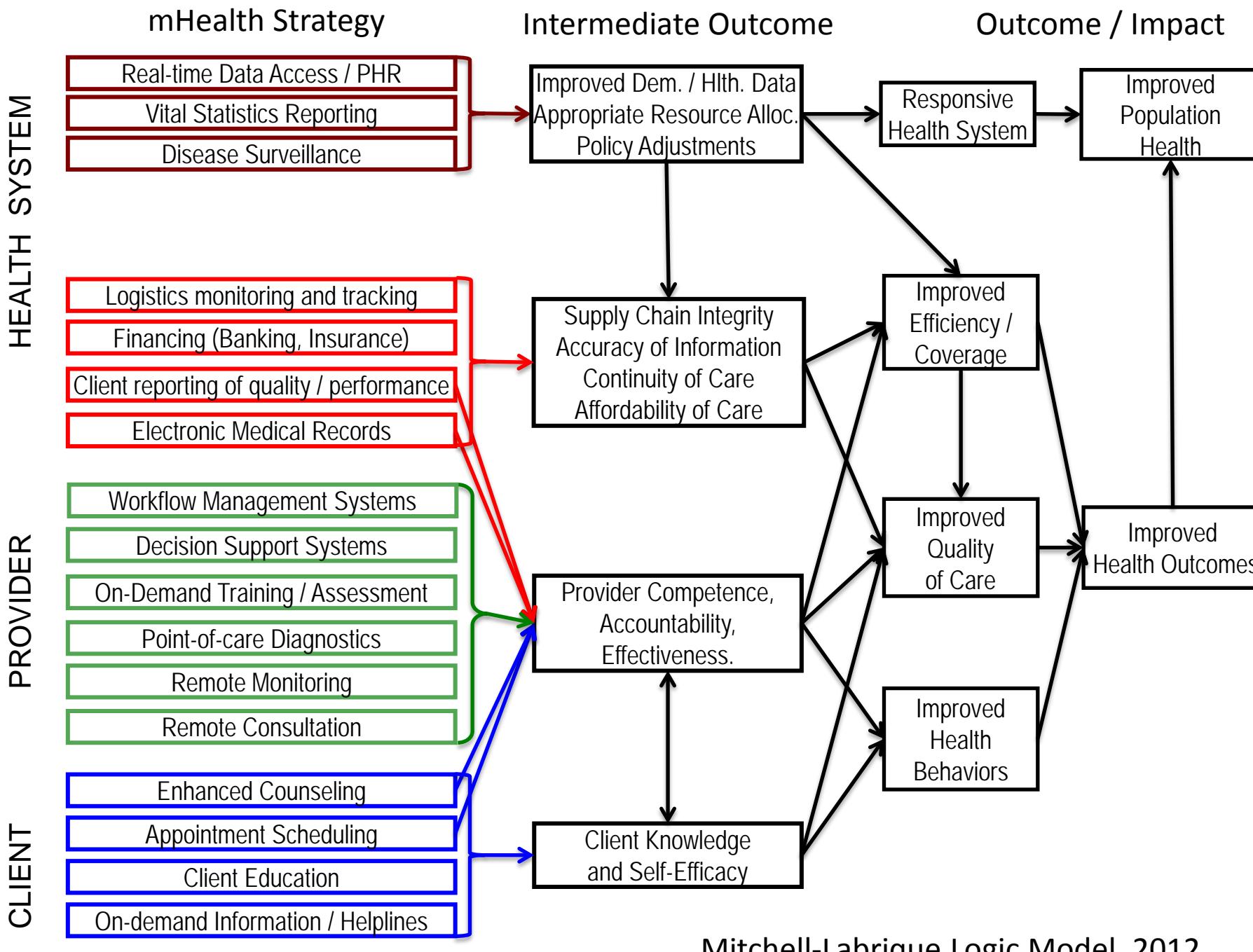
The Gartner “Hype” Cycle



Streamlining the Conversation



The mHealth Alliance's **Evidence Working Group (EWG)** focused on the identification and promotion of research to generate credible evidence to support and identify if, how and to what extent mHealth and eHealth solutions can contribute and increase health impact, particularly in low and middle-income countries (LMIC).



ARTICULATING mHEALTH STRATEGIES AS HEALTH SYSTEMS INNOVATION

Patient
Knowledge and
Self-Efficacy

- INFORMATION
- DEMAND CREATION
- SUPPORT SYSTEMS

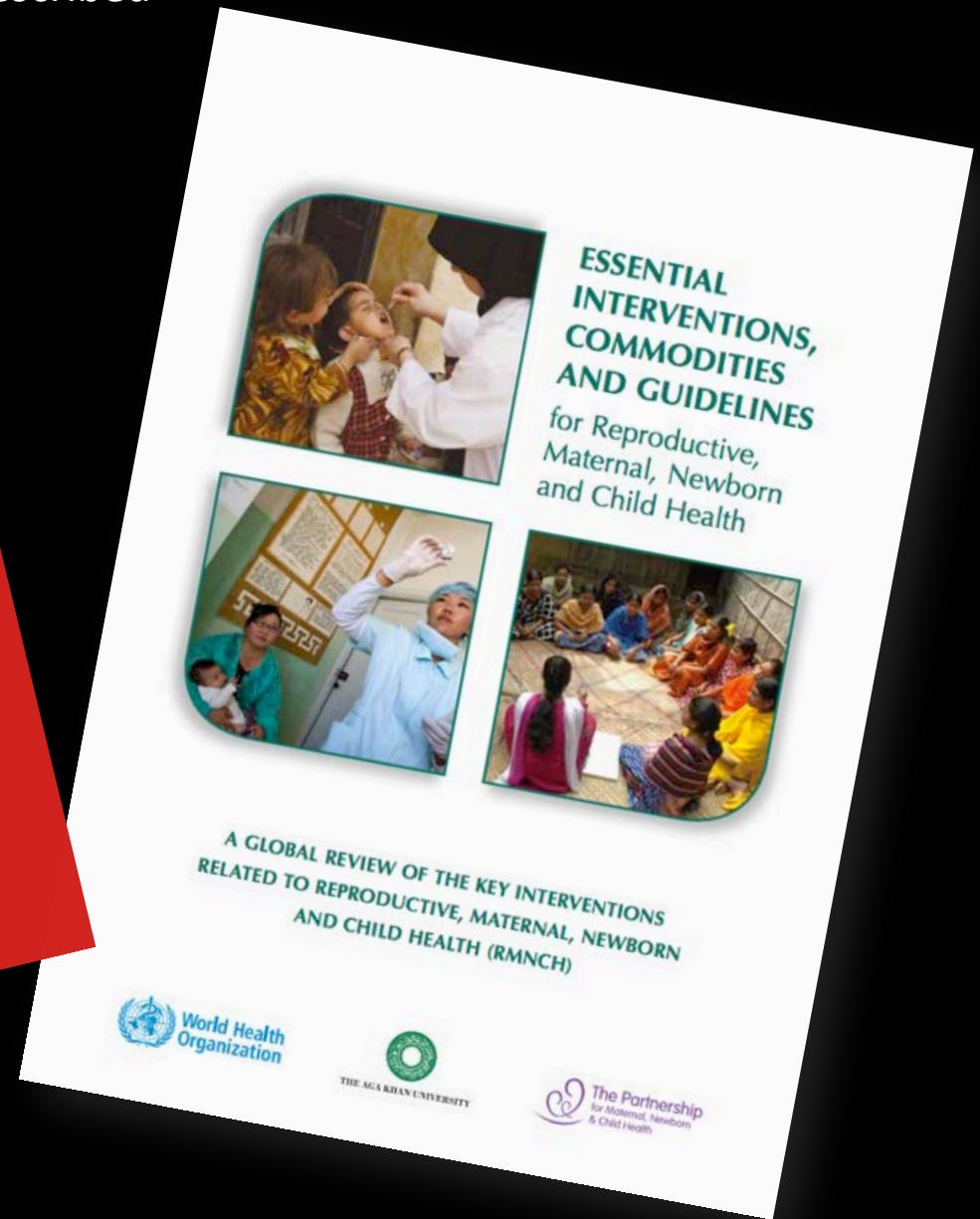
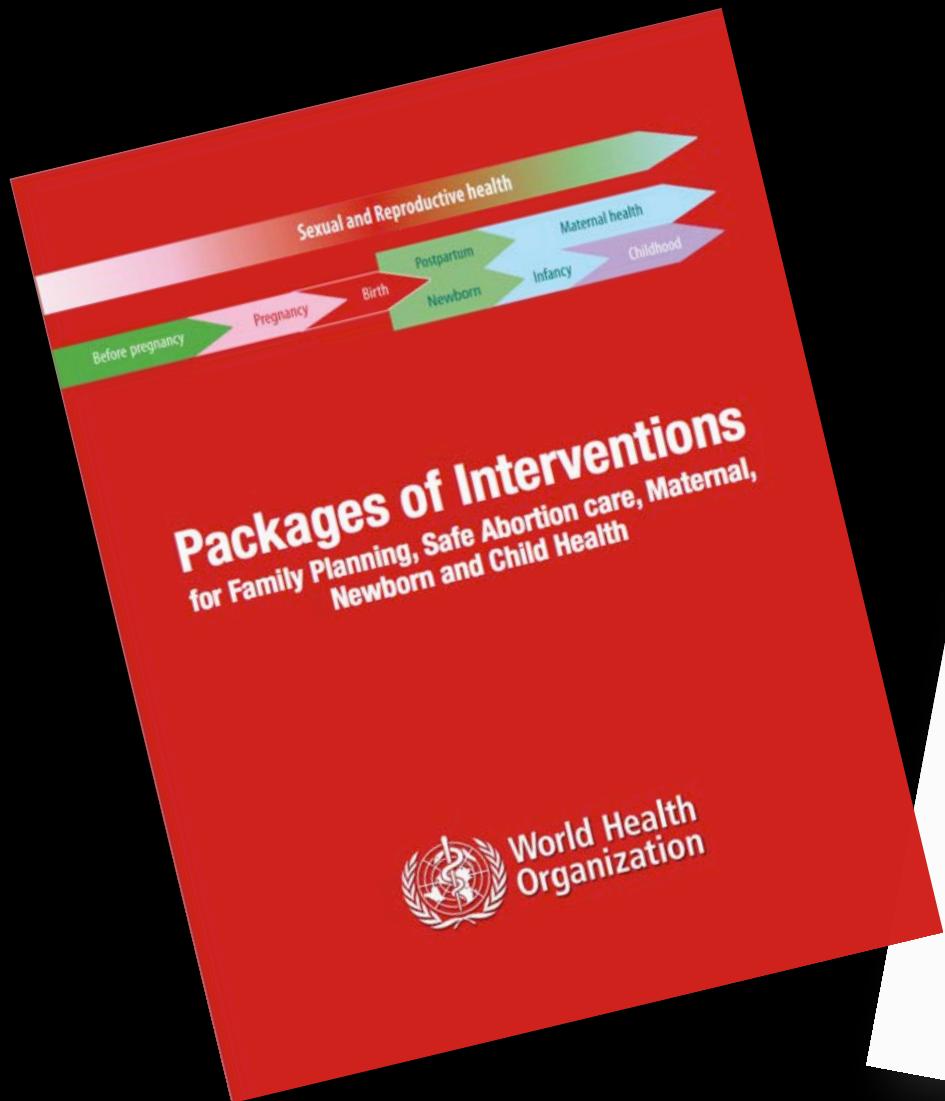
Provider
Competency and
Accountability

- WORK MANAGEMENT
- DECISION SUPPORT
- ENUMERATION
- SURVEILLANCE

Health System
Adequacy

- SUPPLY CHAIN
- STAFF AND FACILITY PERFORMANCE MONITORING
- REFERRAL SUPPORT

Preventive and Curative Public Health **Interventions**
of known efficacy exist and are well described



mHEALTH: A Health Systems Catalyst

EFFECTIVE
COVERAGE



Shift focus from “Does mHealth work?” to “Does mHealth *optimize* what we know works ?”

INTERVENTION
OF KNOWN
EFFICACY

FOLLOW
GUIDELINES

A yellow L-shaped arrow points from the bottom-left text "INTERVENTION OF KNOWN EFFICACY" up and to the right, ending at the top-left of the text "FOLLOW GUIDELINES".

WHAT DO WE WANT?
EVIDENCE-BASED CHANGE
WHEN DO WE WANT IT?
AFTER PEER REVIEW

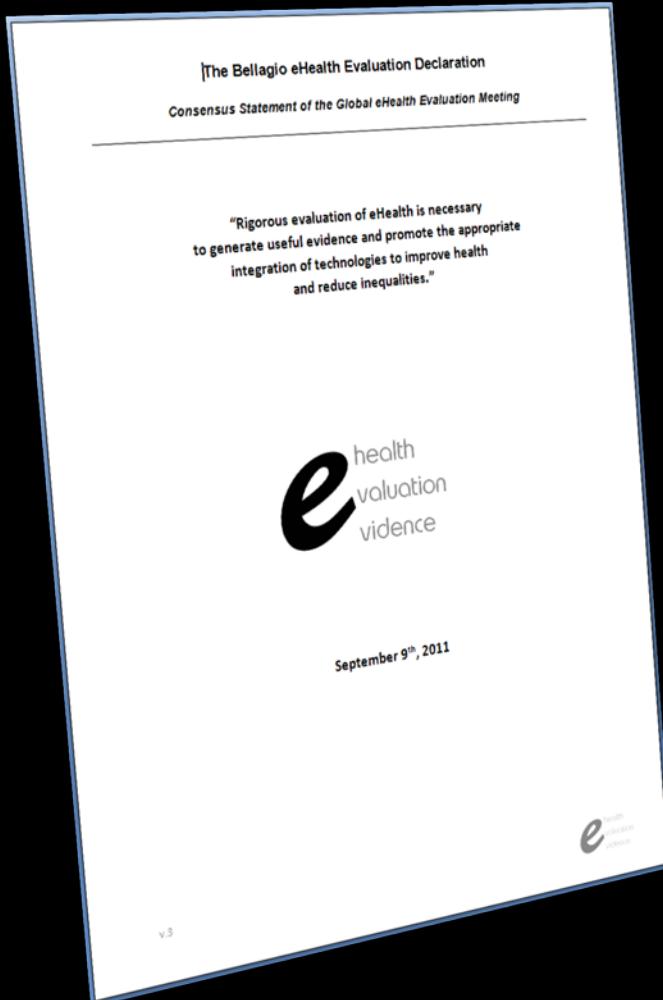


Why “Evidence” ?

1. Two decades of Emphasis on EBD !
2. Health investments in global health are driven by more than market forces
3. Limited resources = Need for stringent, cost-effectiveness based planning
4. Donors: Increased transparency / scrutiny
5. Population-side demand for improved quality
6. e-Health / ICT induced political fatigue

Healthy mSkepticism

The Bellagio eHealth Evaluation Declaration 2011



“Rigorous evaluation of e- & m-Health is necessary to generate useful evidence and promote the appropriate integration of technologies to improve health and reduce inequalities.”

informed by rigorous and focused evaluation. Used appropriately, eHealth has the potential to catalyze, support and monitor health improvements at scale, and to accelerate achievement of national and global development goals, including the United Nations Millennium Development Goals. **If used improperly,**

eHealth may be used to support health system development across all stages. A smart approach to eHealth implementation must be evidence-based, guided by clear priorities, and informed by rigorous and focused evaluation.

If used improperly, eHealth may divert valuable resources and even cause harm... implementation must be guided by evidence...

the use of scale-up environments for eHealth implementation must be evidence-based, guided by clear priorities, and informed by rigorous and focused evaluation.



METHODOLOGY

Community Based
Participatory Research

Systems Science

NEWS

[Dr. Patricia Mabry Co-Authors SOPHE Special Journal Supplement Showcasing New Applications of Systems Science to Health Promotion and Public Health](#)
November, 2013

[The History of the Behavioral and Social](#)

[Home](#) > [Scientific Areas](#) > [Methodology](#) > mHealth - Mobile Health Technologies

mHealth - Workshop on "mHealth Evidence"



mHealth Evidence Workshop
August 16, 2011

Natcher Conference Center | NIH Campus | Bethesda MD

“mHealth tools and interventions must be backed up by **rigorous scientific development, evaluation, and evidence generation** to enhance meaningful innovation and best practices, and to **validate tools and methods for health professionals, consumers, payers, governments, and industry.**”

[Careers in Behavioral and Social Sciences](#)

[More Events >>](#)

advancements, but also alternative study designs and methodologies that ensure that research studies are able to provide timely information within a rapidly evolving field. Evaluation methods that incorporate principles of existing study methodologies, including randomization, step-wedge design, n-of-1 trials, and Practice-Based-Evidence (PBE) methodology were discussed, in addition to methods that borrow from engineering, including Multiphase Optimization Strategy (MOST) and Sequential, Multiple Assignment Randomized Trials (SMART). Ethical issues related to collection, storage and use of real-time masses of identifiable

Scaling Up mHealth: Where Is the Evidence?

Mark Tomlinson^{1*}, Mary Jane Rotheram-Borus², Leslie Swartz³, Alexander C. Tsai^{4,5}

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What Is the Problem?

There are over 6 billion mobile phone subscribers and 75% of the world has access to a mobile phone [1]. Service and care providers, researchers, and national governments are excited at the opportunities mobile health has to offer in terms of improving access to health care, engagement and delivery, and health outcomes [2]. Interventions categorized under the rubric “mobile health” or “mHealth”—broadly defined as medical and public health practice supported by mobile devices [2]—span a variety of applications ranging from the use of mobile phones to improve point of service data collection [3], care delivery [4], and patient communication [5] to the use of alternative wireless devices for real-time medication monitoring and adherence support [6].

A recent World Bank report tracked more than 500 mHealth studies, and many donor agencies are lining up to support the “scaling up” of mHealth interventions [7]. Yet, after completion of these 500 pilot studies, we know almost nothing about the likely uptake, best strategies for engagement, efficacy, or effectiveness of these initiatives. Currently, mHealth interventions lack a foundation of basic evidence [8], let alone a foundation that would permit evidence-based scale up. For example, in Uganda in 2008 and 2009 approximately 23 of 36 mHealth initiatives did not move beyond the pilot phase [9]. The current enthusiasm notwithstanding, the scatter-shot approach to piloting mHealth projects in the absence of a concomitant programmatic implementation and evaluation strategy may dampen opportunities to truly capitalize on the technology. This article discusses a number of points pertinent to developing a more robust evidence base for the scale up of mHealth interventions.

The Essay section contains opinion pieces on topics of broad interest to a general medical audience.

The issues raised are as follows:

Industry/mHealth’s concern. A

In some magical age global publ advantages good evide

promise is that mobile technologies may

notwithsta

global publ

advantages

good evide



ELSEVIER

journal homepage: www.ijmijournal.com

Letter to the Editor

Hope for mHealth: More "y" or "o" on the horizon?

ARTICLE INFO

Keywords:
mHealth
Evidence
Evaluation

ABSTRACT

Objective: Efforts in the domain of mobile health, or mHealth, have been criticized for the unfettered proliferation of pilots and a lack of a rigorous evidence base to support these strategies. In this letter, we present the rationale of a more systematic approach.

Results: We identified 215 unique mHealth studies that were registered in the clinicaltrials.gov database, of which 8.4% ($n=18$) were observational in nature while the remaining 91.6% ($n=197$) were interventional. Of the 215 studies, 81.8% ($n=176$) studies used a classical randomized trial design and 40 new studies were added to the database between May and November 2012 alone. Based on these results, we posit that the field is entering a new 'era' where a body of rigorous evaluation of mHealth strategies is rapidly accumulating.

Over the past decade, a growing 'mHealth' movement has been exploring and identifying opportunities to improve the delivery of, and access to, health services and information. There are currently 6 billion mobile phone subscriptions permeating 87% of the world's population, fueling the interest in mHealth solutions as a sea changer for global health [1]. A broad ecosystem has emerged around using mobile technologies to catalyze healthcare, across the economic spectrum, from sophisticated high-income settings to rural populations where basic health needs are often unmet. Technologies used in this space range from simple voice-only phones to highly sophisticated portable computing devices, resulting in a breadth of solutions being developed and tested globally. At the core of most mHealth strategies lies a mix of conventional approaches that optimize processes and meaningful data utilization, to novel systems that depend on emergent sensor technologies to provide diagnostic insights

and personalize care. mHealth can be used to incentivize action, improve timeliness of data collection and utilization, improve access to and communication with clients, provide information on-demand, improve adherence, reduce attrition to clinical follow-up, and document system-client interactions to improve accountability by identifying and acting on missed contacts. There is widespread recognition of the potential inherent in these technologies, across development investors, national governments, global health agencies and the telecommunications sector.

The first 'era' of mHealth' has been characterized by a global proliferation of proof-of-concept projects. A number of foundations, government agencies and telecommunication operators (e.g., the Bill and Melinda Gates Foundation, USAID, and Vodafone, among others) have provided seed funding mechanisms to help stimulate innovation and experimentation over the past five years. Hundreds of projects,

Need for Ecosystem-wide Structure /
Systematic Approach to Evidence
Synthesis



Improving the evidence for
MOBILE HEALTH

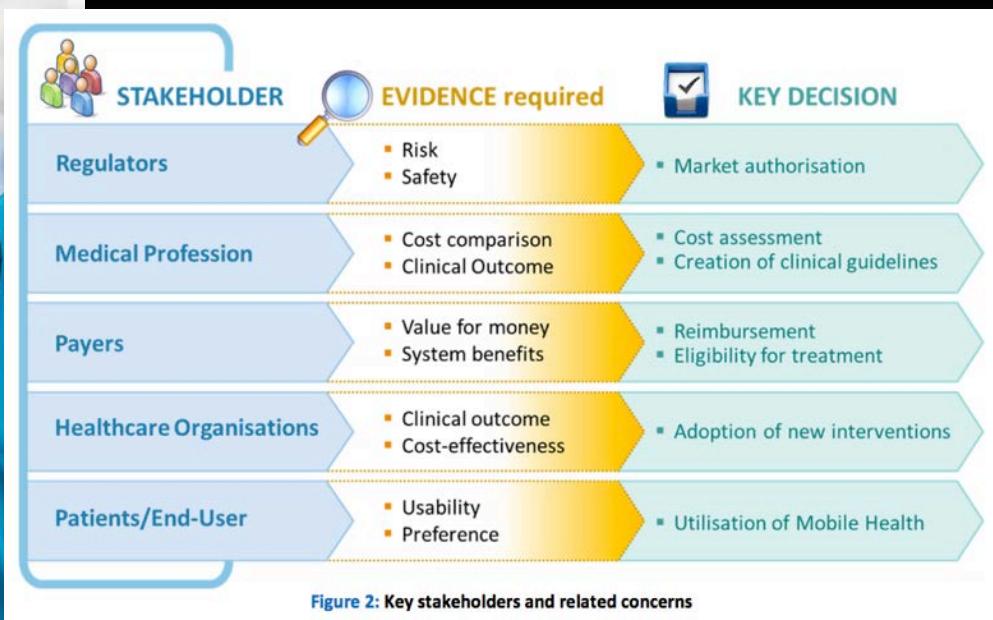


Figure 2: Key stakeholders and related concerns



Core Functions

Convening: Host open meetings with presentations by/for members on selected mHealth topics, providing a forum to discuss accomplishments and **lessons learned**. Establish technical sub-groups as needed to address specific areas, issues or concerns.

Knowledge Sharing: Promote sharing among working group members of **experiences, lessons learned and resources**.

Promising Practices: Identify, develop, promote and advise the **best available approaches to the development, implementation, and evaluation of mHealth projects and practices**. Create tools and resources that enable adoption of **promising practices** and their adaption to local circumstances.

Collaboration: Identify and facilitate opportunities for joint activities and partnerships among mHealth Working Group members in multiple sectors.

Capacity Building: Enhance skills and organizational capacities in mHealth at all levels.

Advocacy: Engage decision makers and stakeholders working in global health and development at the global and national levels to mobilize planning and resources for mHealth.



Recommendations:

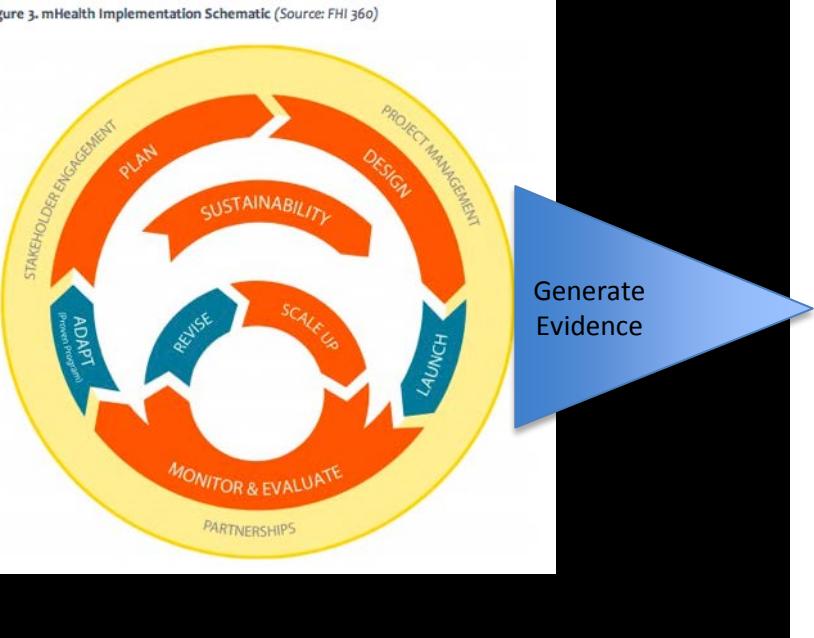
Recommendations for addressing the evidence gaps and enhancing the field of mHealth for MNCH include the following:

- Stakeholders who use evidence, particularly those who influence the research agenda, need to advocate, promote, mandate and ultimately fund activities that would close the identified evidence gaps.
- Greater efforts should be made to identify, capture and disseminate evidence, focusing on the numerous studies and projects in mHealth and MNCH that exist but are not reflected in the literature nor widely shared with the global health community.
- The technical and research communities that have been driving the mHealth agenda ought to frame the evidence in language that resonates with the global health community, paying particular attention to the global health trends that have become priorities to major donors.
- Gaps in the evidence around mHealth and MNCH should be viewed as opportunities for future research.



The mHealth Planning Guide: Key Considerations for Integrating Mobile Technology into Health Programs

Figure 3. mHealth Implementation Schematic (Source: FHI 360)



PUBLICATIONS MATRIX OF MHEALTH IMPLEMENTATION RESOURCES FOR
The mHealth Planning and Implementation Guide: How to Integrate Mobile Technology into Health Programming
LAST UPDATED: SEPTEMBER 20, 2013

YEAR	PUBLICATION TITLE & HYPERLINK	PLANNING & IMPLEMENTATION TOPICS											
		Case Studies	Program Planning	Landscape Analysis	Target Population	Technology Design	Content Development	Pilot Testing	Project Management	Partnerships	Beta & Program Testing	Monitoring & Evaluation	Scaling Up
2013	GSMA mWomen Marketing Handbook	X		X					X	X	X	X	X
	Lessons Learned: ICTs for Supply Chain Management in Low-Resource Settings	X		X	X	X				X	X		X
	M4RH Cost Considerations	X	X		X			X					X
	m-Enabled Inclusive Business Models: Applications for Health	X			X				X	X	X	X	X
	mHealth Compendium, Edition Two	X							X	X			X
	mHealth Innovations as health system strengthening tools: 12 common applications and a visual framework	X	X	X		X							
	Operational Challenges in the Cambodian mHealth Revolution	X	X	X	X	X							
	Patient Privacy in a Mobile World: A Framework to Address Privacy Law Issues in Mobile Health	X	X	X	X	X		X	X		X		
	Planning an Information Systems Project: A Toolkit for Public Health Managers	X			X			X	X				
	FLOS Medicine – February 2013 Issue	X			X					X	X	X	X
	Scaling Mobile for Development A Developing World Opportunity - Final Report, Stildecke, and Interim Report	X	X	X	X						X	X	
	Scaling Up Mobile Health: Developing mHealth Partnerships for Scale	X							X		X		X
	Sustainable Financing for Mobile Health (mHealth)	X	X						X		X	X	X
	The State of Standards and Interoperability for mHealth among Low- and Middle-Income Countries			X	X				X		X	X	
	The Truth About Disruptive Innovation			X	X	X							X
	Total Cost of Ownership Model for CommCare		X	X	X				X				
	A Development and Evaluation Process for mHealth Interventions: Examples From New Zealand - Abstract and POPLINE				X			X	X				
	Applying a framework for assessing the health system challenges to scaling up mHealth in South Africa	X	X	X							X	X	
	Factors that promote or inhibit implementation of e-health systems: An explanatory systematic review		X					X					X
	GSMA mWomen Research Toolkit		X	X	X	X							
	Leveraging Mobile Technologies for Maternal, Newborn, and Child Health: A Framework for Engagement		X	X					X	X			X
	MAMA Global Monitoring and Evaluation Framework		X	X					X	X	X	X	X
	mBCC Field Guide: A Resource for Developing Mobile Behavior Change Communication Programs		X	X	X	X	X	X	X	X	X	X	
	mHealth Compendium, Edition One		X						X		X	X	X
	National eHealth Strategy Toolkit			X	X	X			X	X			
	The Economics of eHealth and mHealth			X							X	X	
	Building Partnerships That Work: Practical Learning on Partnering in mHealth		X						X	X			X
	mHealth: New Horizons for Health through Mobile Technologies		X	X	X						X		X
	Scaling Mobile Health: Elements Necessary for the Successful Scale Up of mHealth in Developing Countries		X									X	X
	The Use of Information and Communication Technology in Family Planning, Reproductive Health, and Other Health Programs: A Review of Trends and Evidence		X	X		X						X	X
	Barriers and Gaps Affecting mHealth in Low and Middle Income Countries										X		X
	Human-Centered Design Toolkit				X	X	X	X	X				X
	Sizing the Business Potential of mHealth in the Global South: A Practical Approach		X	X	X					X			X
	mHealth: A Developing Country Perspective		X	X	X								X
	Towards the Development of an mHealth Strategy: A Literature Review		X	X	X	X			X	X			X



PLBC EVIDENCE SUMMIT

Population-Level Behavior Change Evidence Summit for Global Health

Home | Vision | ERT | Milestone | Partners

WELCOME TO THE POPULATION-LEVEL **BEHAVIOR CHANGE EVIDENCE SUMMIT**

A look at USAID Administrator Dr. Rajiv Shah's vision on innovation and global health.

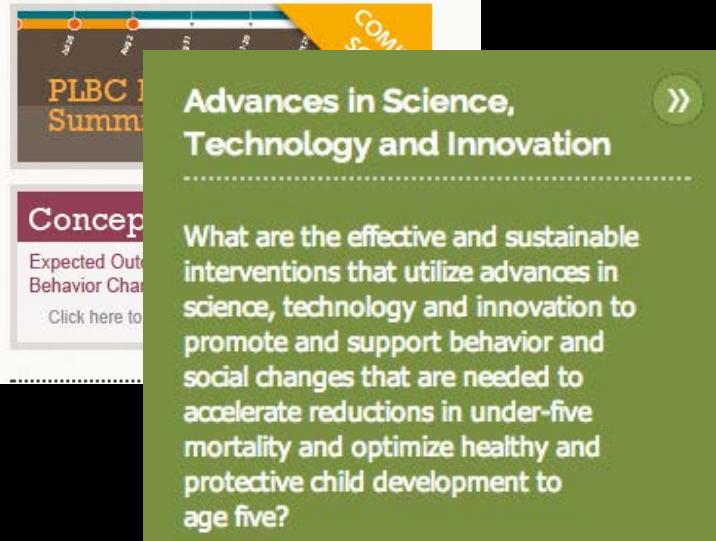
[Learn more »](#)

Call to Action

Call to Action Sets Course to End Preventable Child Deaths/ The Sustained Effort: A Promise Renewed

On June 14-15, 2012, over 80 countries represented by governments and a multitude of partners from the private sector, civil society, and faith-based organizations gathered at the Child Survival Call to Action – a high-level forum convened by the governments of Ethiopia, India and the United States, in collaboration with UNICEF... [Read more »](#)

Evidence Review Teams (ERT)



PLBC Evidence Summit

Advances in Science, Technology and Innovation

Concepts

What are the effective and sustainable interventions that utilize advances in science, technology and innovation to promote and support behavior and social changes that are needed to accelerate reductions in under-five mortality and optimize healthy and protective child development to age five?

Text Messaging as a Tool for Behavior Change in Disease Prevention and Management

Heather Cole-Lewis* and Trace Kershaw

* Correspondence to Heather Cole-Lewis, Yale University School of Epidemiology and Public Health, P.O. Box 208034, New Haven, CT 06520-8034 (e-mail: heather.cole-lewis@yale.edu).

Accepted for publication January 25, 2010.

Mobile phone text messaging is a potentially powerful tool for behavior change because it is widely inexpensive, and instant. This systematic review provides an overview of behavior change interventions in disease management and prevention delivered through text messaging. Evidence on behavior change outcomes was compiled from randomized or quasi-experimental controlled trials of text message interventions published in peer-reviewed journals by June 2009. Only those interventions using text message as the mode of communication were included. Study quality was assessed by using a standardized measure. Six articles representing 12 studies (5 disease prevention and 7 disease management) were included. Interventions ranged from 3 months to 12 months, none had long-term follow-up, and message frequency varied. In sufficiently powered studies, 8 found evidence to support text messaging as a tool for behavior change across age, minority status, and nationality. Nine countries are represented in this review, but it is noted that only one is a developing country, given potential benefits of such a widely accessible, relatively inexpensive tool for health behavior change. Methodological issues and gaps in the literature are highlighted, and recommendations for future studies are provided.

cellular phone; health behavior; intervention studies; review

Abbreviations: HIV, human immunodeficiency virus; mHealth, mobile health.

BACKGROUND

By the end of 2008, there were an estimated 4 billion mobile phone subscribers worldwide. Since there were only 1 billion subscribers in 2002, it is apparent that use of this technology is growing rapidly [1]. Ninety-five percent of countries in the world have mobile phone networks, and the majority of these countries have more mobile phone than landline subscriptions [2,3]. In nearly a third of the countries, the number of cell phones in use is greater than the number of people living in those countries [4].

Mobile phones have had a considerable impact in developing countries [3,5,6]. Communication by mobile phone is less expensive than alternative options such as landline telephones or standard Internet [1,7]. Millions of people across Africa and Asia who never had access to traditional phone communication now use mobile phones on a regular basis [3,5,8]. Additionally, across the world (in both developing and developed countries), people are gaining access to the Internet via mobile phones. For many, the mobile

phone is currently the primary mode of access to the Internet, which the Pew Internet & American Life Project suggests will be the case for the entire world [8]. In a recent survey, 23% of Americans report Internet via their mobile phone on a typical day, a 64% increase from 2007 [10]. United Nations report that the widespread use of mobile technologies makes them feasible for the use of information and communication technologies throughout the world, given the potential of these technologies as catalysts for reaching the Millennium Development Goals for 2015 [8].

Mobile technology has already been around the world; its utilization is growing, not just for interpersonal communication but also for aspects of communication infrastructure including finance, education, and marketing. Mobile technology is also increasingly used for health and prevent disease [11,13–17]. (mHealth) is the use of mobile phone technology

The Effectiveness of Mobile-Health Technologies to Improve Health Care Service Delivery Processes: A Systematic Review and Meta-Analysis

Caroline Free^{1*}, Gemma Phillips², Louise Watson³, Leandro Galli⁴, Lambert Felix⁵, Phil Edwards³, Vikram Patel³, Andy Haines³

1 Clinical Trials Unit, London School of Hygiene & Tropical Medicine, London, United Kingdom, **2** Department of Health Services Research and Policy, London School of Hygiene & Tropical Medicine, London, United Kingdom, **3** Department of Population Health, London School of Hygiene & Tropical Medicine, London, United Kingdom, **4** Warwick University, Coventry, United Kingdom, **5** Department of Primary Care and Public Health, Imperial College, London, United Kingdom

Abstract

Background: Mobile health interventions could have beneficial effects on health care delivery processes. We aimed to conduct a systematic review of controlled trials of mobile technology interventions to improve health care delivery processes.

Methods and Findings: We searched for all controlled trials of mobile technology based health interventions using MEDLINE, EMBASE, PsycINFO, Global Health, Web of Science, Cochrane Library, UK NHS HTA (Jan 1990–Sept 2010). Two authors independently extracted data on allocation concealment, allocation sequence, blinding, completeness of follow-up, and measures of effect. We calculated effect estimates and we used random effects meta-analysis to pool estimates. We identified 42 trials. None of the trials had low risk of bias. Seven trials of health care provider support reported 25 outcomes regarding appropriate disease management, of which 11 showed statistically significant benefits. One trial reported a statistically significant improvement in nurse/surgeon communication using mobile phones. Two trials reported statistically significant reductions in correct diagnoses using mobile technology photos compared to gold standard. The pooled effect on appointment attendance using text message (short message service or SMS) reminders versus no reminder was increased, with a relative risk (RR) of 1.06 (95% CI 1.05–1.07, $I^2 = 6\%$). The pooled effects on the number of cancelled appointments was not significantly increased RR 1.08 (95% CI 0.89–1.30). There was no difference in attendance using SMS reminders versus other reminders (RR 0.98, 95% CI 0.94–1.02, respectively). To address the limitation of the older search, we also reviewed more recent literature.

Conclusions: The results for health care provider support interventions on diagnosis and management outcomes are generally consistent with modest benefits. Trials using mobile technology-based photos reported reductions in correct diagnoses when compared to the gold standard. SMS appointment reminders have modest benefits and may be appropriate for implementation. High quality trials measuring clinical outcomes are needed.

Please see later in the article for the Editors' Summary.

Citation: Free C, Phillips G, Watson L, Galli L, Felix L, et al. (2013) The Effectiveness of Mobile-Health Technologies to Improve Health Care Service Delivery Processes: A Systematic Review and Meta-Analysis. *PLoS Med* 10(1): e1001363. doi:10.1371/journal.pmed.1001363

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Abbreviations: ECG, electrocardiogram; m-Health, mobile-health; MMS, multimedia message; PDA, personal digital assistant; RR, relative risk; SMS, short message service

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PRISMA 2009 Flow Diagram

^{n¹} = Original search + updated search + trial registries

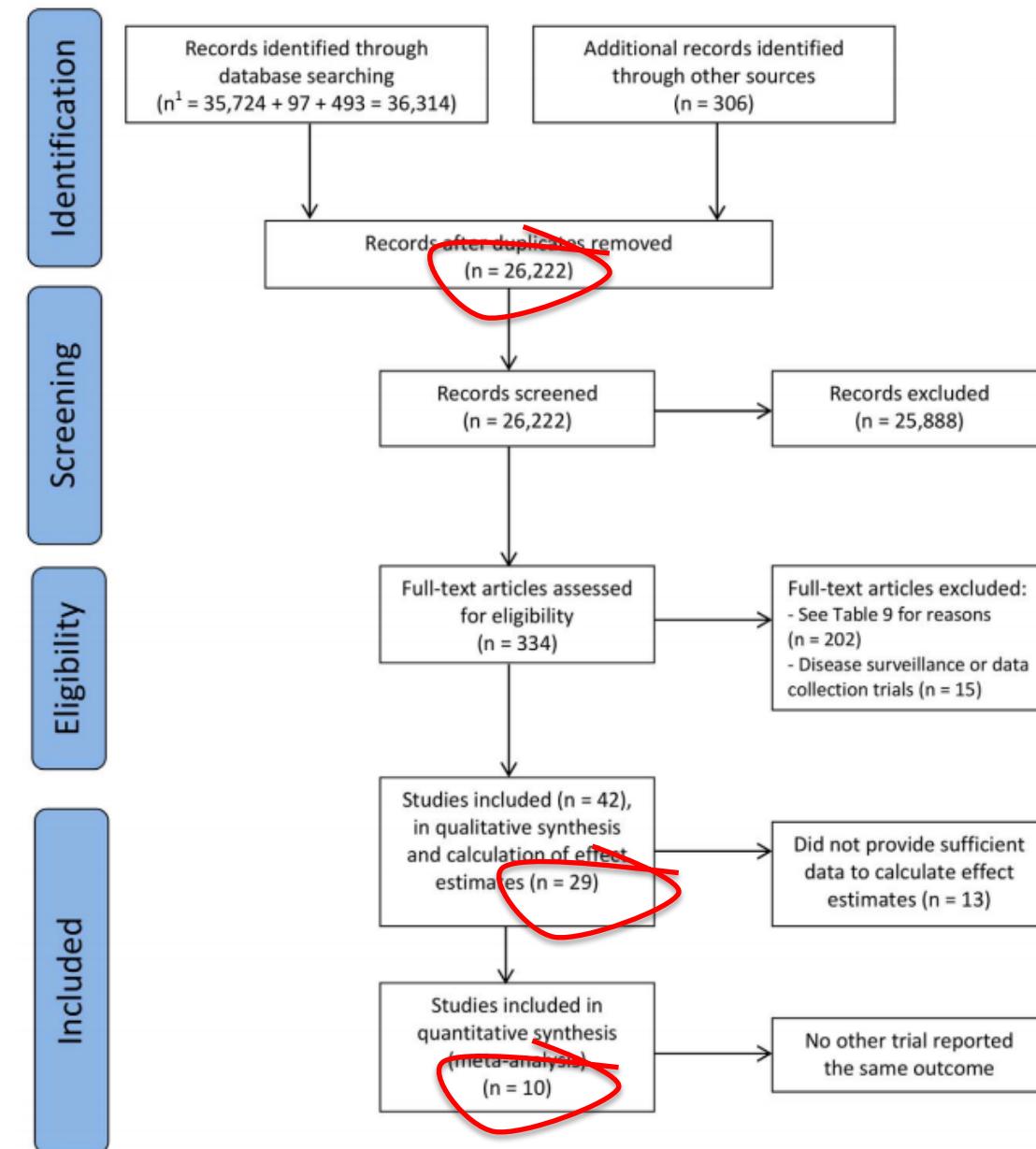


Figure 1. PRISMA 2009 flow diagram.
doi:10.1371/journal.pmed.1001363.g001



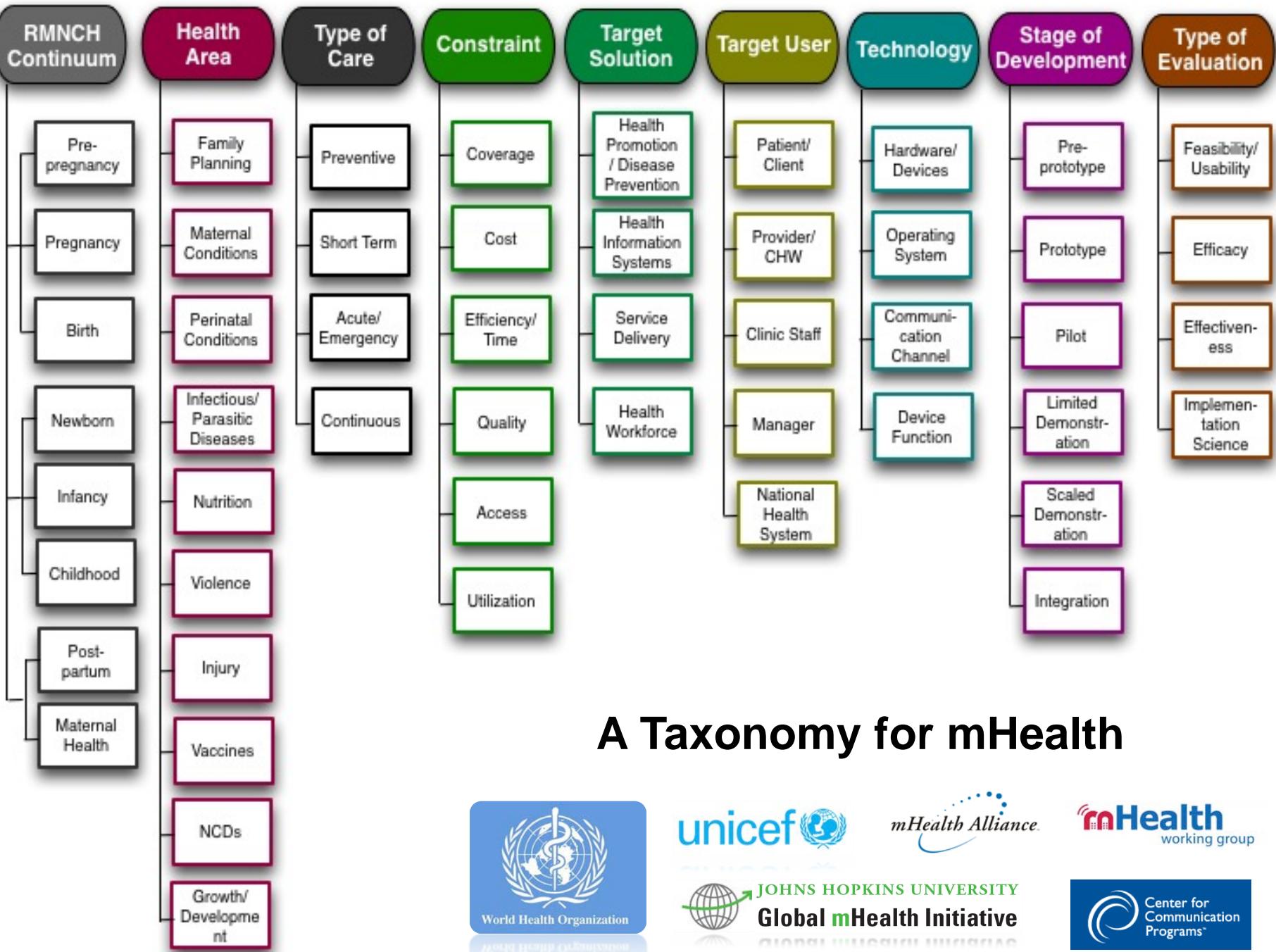
mHealth Technical Evidence Review Group for RMNCH

<http://bit.ly/who-mterg>

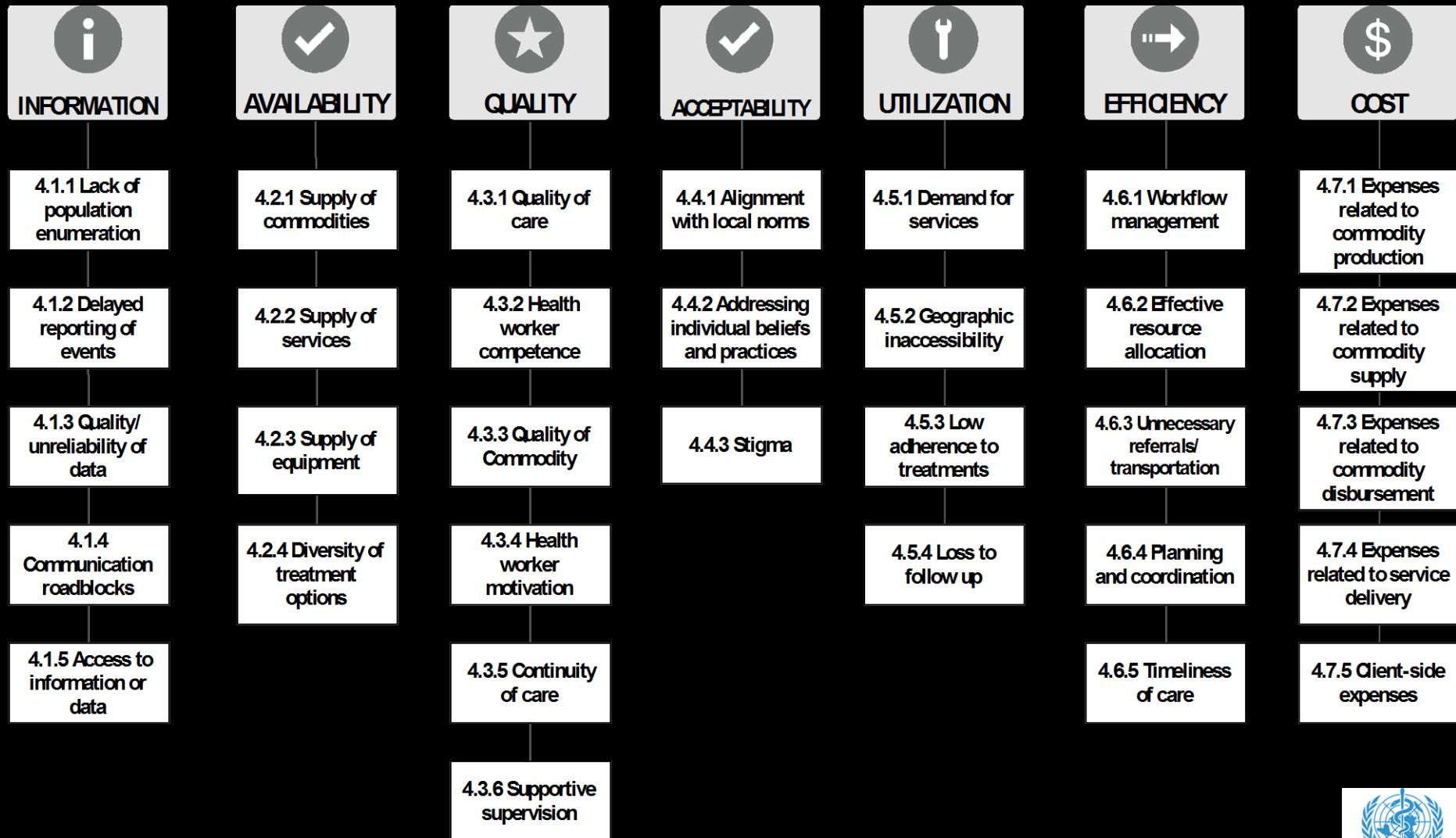
“Providing governments and implementing agencies objective, evidence-based guidance for the selection and scale of mHealth strategies across the reproductive, maternal, newborn and child health continuum”

Step 1: Develop a common vocabulary

Help us as innovators, researchers,
funders talk about mHealth...



What is the problem we're trying to solve ?



TECHNICAL CONCEPT

mHealth innovations as health system strengthening tools: 12 common applications and a visual framework

Alain B Labrique,^a Lovanya Vasudevan,^b Erica Kochi,^b Robert Fabricant,^a Garrett Mehl^a

This new framework lays out 12 common mHealth applications used as health systems strengthening innovations across the reproductive health continuum.

The rapid proliferation of mHealth projects—albeit mainly pilot efforts—has generated considerable enthusiasm among governments, donors, and implementers of health programs.¹ In many instances, these pilot projects have demonstrated conceptually how mHealth can alleviate specific health system constraints that hinder effective coverage of health interventions.

Large-scale implementation or integration of these mHealth innovations into health programs has been limited, however, by a shortage of empirical evidence supporting their value in terms of cost, performance, and health outcomes.^{2–4} Governments in low- and middle-income countries face numerous challenges and competing priorities, impeding their ability to adopt innovations.⁵ Thus, they need robust, credible evidence about mHealth projects in order to consider mHealth alongside other health interventions, and guidance about how to achieve broader health system goals.⁶ Their tolerance for system instability or failure can be low, even when the status quo may be equally, or more, unreliable.

Current large-scale efforts and implementation research initiatives are working to address the evidence gaps and to demonstrate the impact of mHealth investments on health system targets.⁷ Other efforts are underway to synthesize such findings.⁸

Applying a health systems lens to the evaluation of mHealth initiatives requires different indicators and methodologies, shifting the assessment from whether the mHealth initiative “works” to process evaluation or proxy indicators of the health outcome(s) of interest. This new way of thinking would facilitate selection of mHealth interventions that align with the identified challenges. In other words, it would drive programs to first identify the key obstacles, or constraints, to delivering proven health interventions effectively, and to then apply appropriate mHealth strategies that could overcome these health system constraints.⁹

Promising mHealth as a range of tools for overcoming known health system constraints, as a health systems “catalyst,” may also improve communication

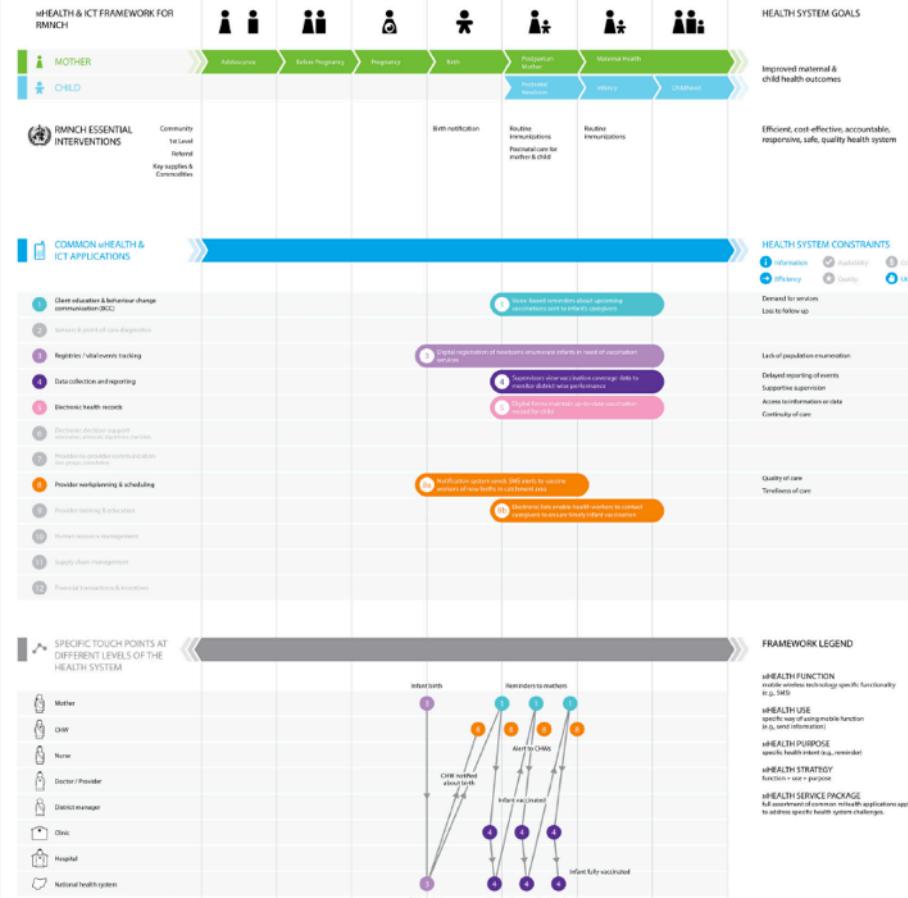


UNDP • UNFPA • UNICEF • WHO • World Bank
Special Programme of Research, Development and Research Training in Human Reproduction



FIGURE 3. Sample Application of the mHealth and ICT Framework for RMNCH

EXAMPLE PROJECT VACCINATE SERVICE PACKAGE



Abbreviations: CHW, community health worker; ICT, information and communications technology; RMNCH, reproductive, maternal, newborn, and child health.

The fictional “Project Vaccinate” is an mHealth system that integrates 6 of the 12 common mHealth applications to identify newborns and support families and community health workers in ensuring timely and complete vaccination.

12 Common Applications of mHealth

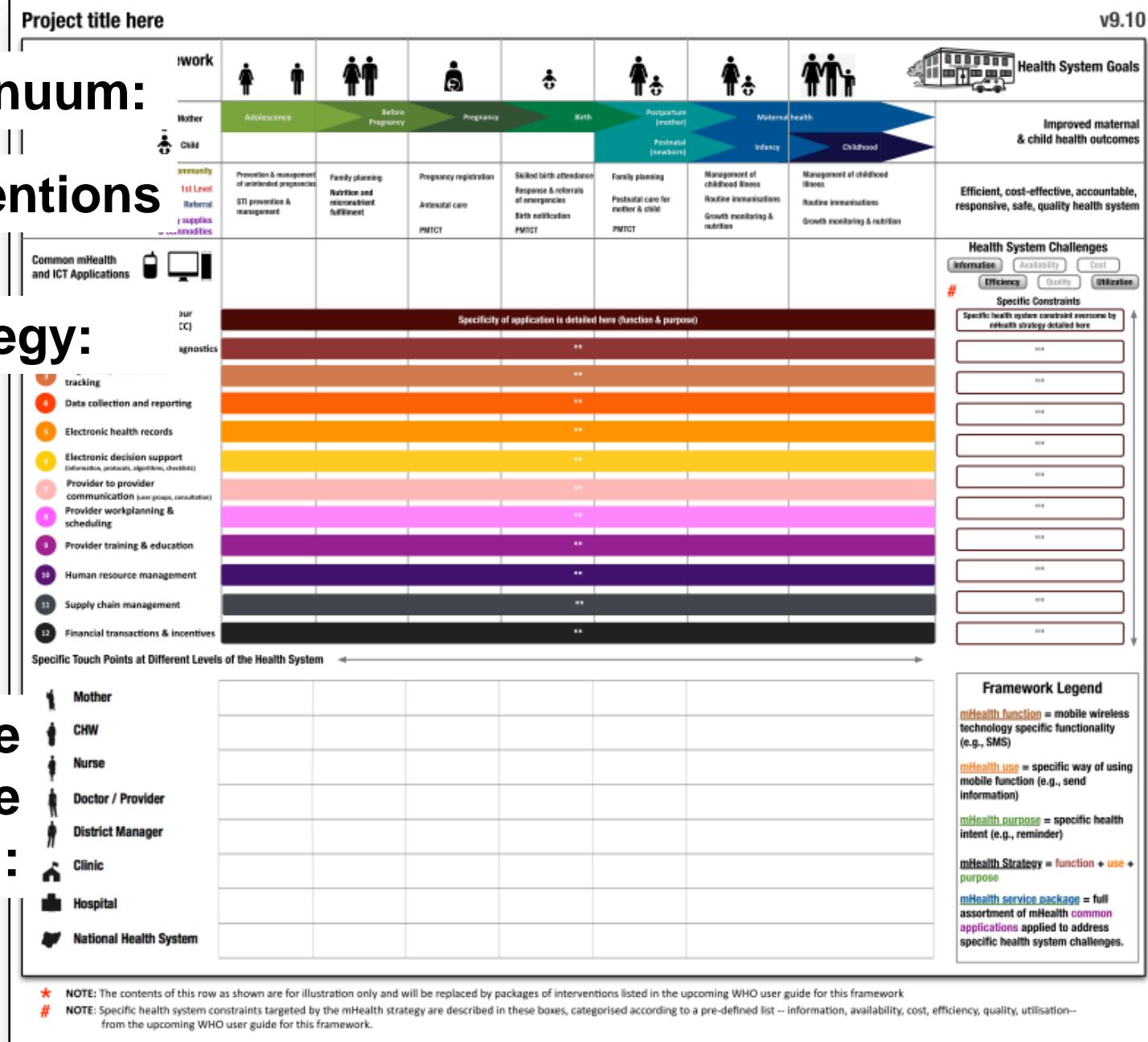
- | | | | |
|---|---|----|---|
| 1 | Client education & behaviour change communication (BCC) | 7 | Provider-to-provider communication
User groups, consultation |
| 2 | Sensors & point-of-care diagnostics | 8 | Provider workplanning & scheduling |
| 3 | Registries / vital events tracking | 9 | Provider training & education |
| 4 | Data collection and reporting | 10 | Human resource management |
| 5 | Electronic health records | 11 | Supply chain management |
| 6 | Electronic decision support
Information, protocols, algorithms, checklists | 12 | Financial transactions & incentives |

RMNCH Continuum:

Known Interventions

mHealth Strategy:

Touching these
“actors” in the
system:



v9.10

Project title here

mHealth and ICT Framework for RMNCH

RMNCH continuum

Common mHealth and ICT Applications

- Client education & behaviour change communication (BCC)
- Registries / vital events tracking
- Data collection and reporting
- Electronic health records
- Provider workplanning & scheduling

Specific Touch Points at Different Levels of the Health System

- Mother
- CHW
- Nurse
- Doctor / Provider
- District Manager
- Clinic
- Hospital
- National Health System

NOTE: The contents of this row are shown for illustration only and will be replaced by packages of interventions listed in the upcoming WHO user guide for this framework.

NOTE: Specific health system constraints targeted by the mHealth strategy are described in these boxes, categorised according to a pre-defined list – information, availability, cost, efficiency, quality, utilisation– from the upcoming WHO user guide for this framework.

Project Vaccinate example

mHealth and ICT Framework for RMNCH

RMNCH continuum	Adolescence	Before Pregnancy	Pregnancy	Birth	Postpartum (mother)	Postnatal (infant)	Infancy	Childhood	Health System Goals
Community 1st Level Referral Key supplies & Commodities					Birth notification	Postnatal care for mother & child			Improved maternal & child health outcomes
Common mHealth and ICT Applications									Health System Challenges
1. Client education & behaviour change communication (BCC)						1. Voice-based reminders about upcoming vaccinations sent to infant's caregivers			Information
2. Registries / vital events tracking						3. Digital registration of newborns ensures infants in need of vaccination services			Efficiency
3. Data collection and reporting						4. Supervisors view vaccination coverage data to monitor district-wise performance			Availability
4. Electronic health records						5. Digital forms maintain up-to-date vaccination record for the child			Cost
5. Provider workplanning & scheduling						6a. Electronic lists enable health workers to contact caregivers to ensure timely infant vaccination			# Specific Constraints
						6b. Notification system sends SMS alerts to vaccine workers of new births in catchment area			Mother's unawareness of infant's vaccination schedule
									Delayed or missed identification of infants
									Vaccination camps not held on schedule
									Loss or damage of paper vaccination cards
									Delayed or missed identification of unvaccinated infants

Specific Touch Points at Different Levels of the Health System

Framework Legend

- mHealth function** = mobile wireless technology specific functionality (e.g., SMS)
- mHealth use** = specific way of using mobile function (e.g., send information)
- mHealth purpose** = specific health intent (e.g., reminder)
- mHealth Strategy** = function + use + purpose
- mHealth service package** = full assortment of mHealth: common applications applied to address specific health system challenges.

NOTE: The contents of this row are shown for illustration only and will be replaced by packages of interventions listed in the upcoming WHO user guide for this framework.

NOTE: Specific health system constraints targeted by the mHealth strategy are described in these boxes, categorised according to a pre-defined list – information, availability, cost, efficiency, quality, utilisation– from the upcoming WHO user guide for this framework.

Step 2: Develop repositories of m-evidence and m-activities

Help to identify, collate and grade the quality of information on mHealth strategies

[Browse All Records](#)[Advanced Search](#)[About](#)[Partners](#)

Search the world's mHealth Evidence

Currently indexing almost 6000 global evidence sources

[Search](#)

What is mHealth Evidence?

mHealth is the use of mobile information and communication technologies for improving health. It can be used for a wide range of purposes, including health promotion and illness prevention, health care delivery, training and supervision, electronic payments, and information systems. Many believe that it has the potential to shift the paradigm on when, where, how and by whom health services are provided and accessed.

But mHealth is a young field and much of the evidence on “what works” is still emerging. Even the evidence that exists can sometimes be difficult to find.



BROWSE MHEALTH EVIDENCE TOPICS

- Beneficiary Age Range
- Care Model
- Health Domain
- Health System Constraint
- Location
- mHealth Application
- Special Population
- Stage of Development
- Stage of Evaluation
- Target User
- Technology

VIEW MOST RECENT RECORDS

- Temporal motifs reveal homophily, gender-specific patterns, and group talk in call sequences.
- Tobacco smoking surveillance: is quota sampling an efficient tool for monitoring national trends? A comparison with a random cross-sectional survey.
- Mobile Phone-based Syndromic Surveillance System, Papua New Guinea.
- Design and Test of a Hybrid Foot Force Sensing and GPS System for Richer User Mobility Activity Recognition.
- Mobile phone tracking: in support of modelling traffic-

FEATURES

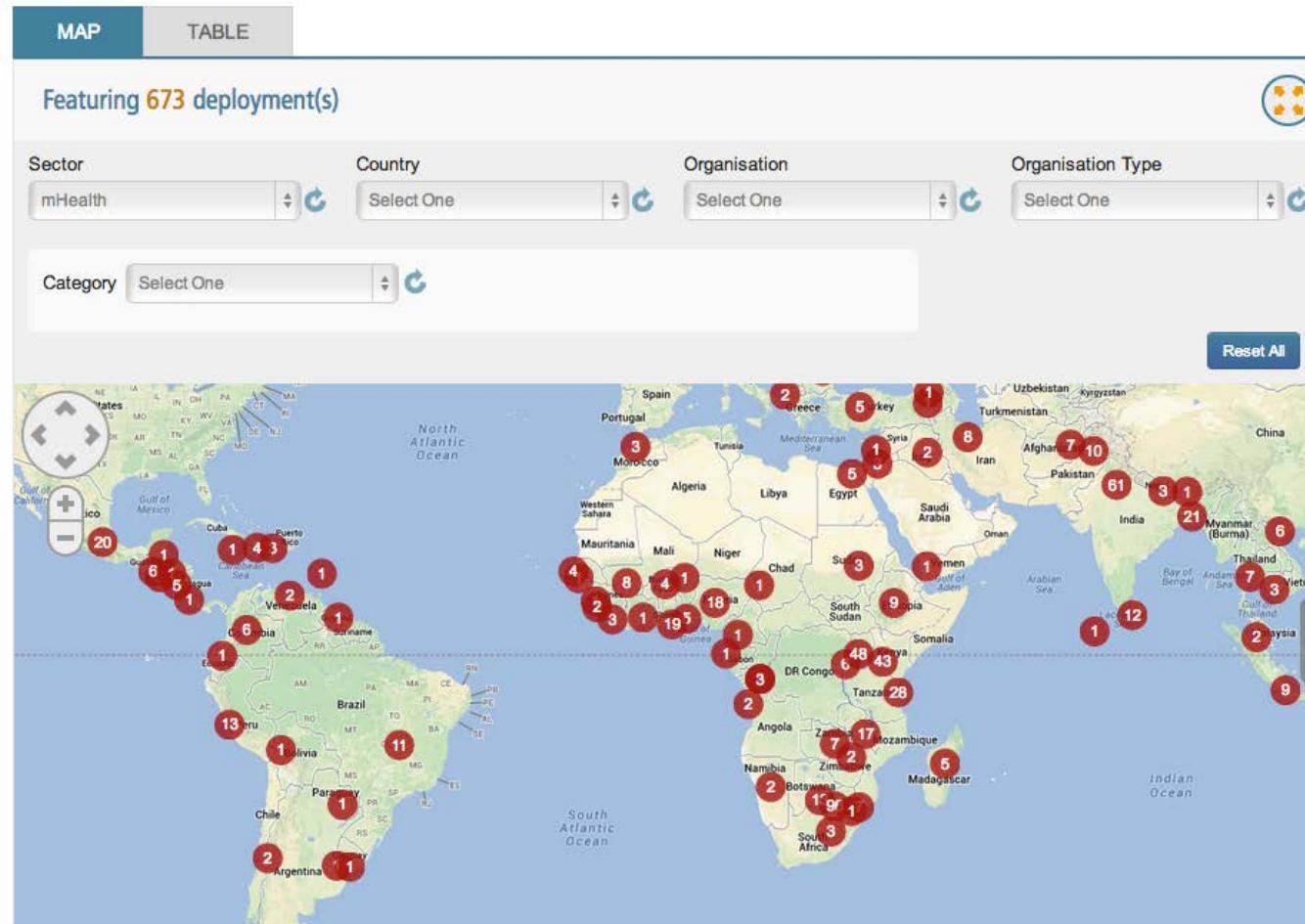
- **Full text search** of more than 6000 records
- **Advanced search** functionality using keywords, MESH terms, PubMed ID # or dates
- Ability to **browse** the **mHealth Evidence Taxonomy**
- Ability to save searches and set up **saved search alerts**
- Quick link specific records under “**My Documents**”
- **Social media** integration via Facebook, Twitter, etc.



Products & Services

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MREGISTRY.ORG

A Global mHealth Registry



This form will allow you quickly be entered into a processing queue for inclusion in the WHO Global Registry of Projects focusing on activities that leverage mobile and information / communications technologies and associated content to strengthen community and frontline health workers.

What is the Project Name? *

What is the Project Location? *

Select principal country or countries

none selected

Please enter the main city in which the project operates

GPS coordinates can only be collected when outside.

latitude (x.y °)

longitude (x.y °)

altitude (m)

accuracy (m)



Brief Project Description (Optional)

You may provide more details, but this is not required.

What stage of activity are you in? *

- Conceptual Stage
- Planning and Fundraising
- Pilot/Test Implementation

Step 3: Facilitate the review and synthesis of evidence

Help to understand when sufficient information exists to recommend mHealth as part of the standard of care

mTERG Criteria for Grading mHealth Information Quality



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Sexual and reproductive health

Use of mobile technology for health (mHealth)



HRP/Mark Leong

The use of mHealth has emerged as an important innovation with tremendous potential to strengthen health systems in low- and middle-income settings, through improved access to knowledge and information, by improving service delivery and reducing response time to crises.

WHO mHealth Technical and Evidence Review Group (mTERG) for reproductive, maternal, newborn and child health

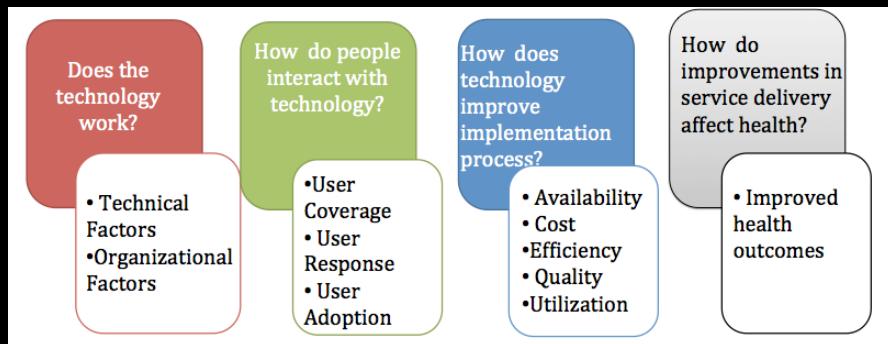
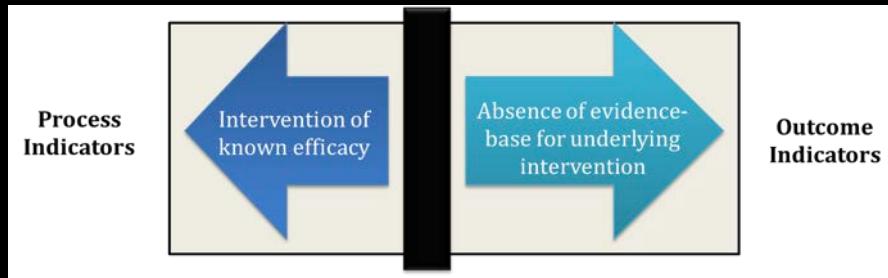
The WHO mTERG represents a WHO-convened group of recognized global experts at the intersection of mHealth, reproductive, maternal, newborn and child health, across research and programme implementation foci. Through a transparent process of discussions, research review and systematic evaluation, the mTERG works to establish methodologies and build consensus recommendations to enable the identification of mHealth strategies for which there is substantial evidence of health system value.

The mTERG is comprised of experts representing ministries of health, academic and research institutions, implementing organizations, and professional associations.

Table/ Criteria no.	Category of Standards	Total Score per Standard
6.2	Overarching Standards	
1	Theoretical Framework	3
2	Technological Considerations	4
3	Problem Focus	1
	Total	8
6.3	Feasibility/Usability Standards	
1	Feasibility	3
2	Usability	4
3	Technology	3
4	Formative Qualitative and Quantitative Research	4
5	Generalizability	2
	Total	16
6.4	Efficacy/Effectiveness Standards	
1	Research Question	1
2	Study Design/ Methods	4
3	Sampling	3
4	Population Context	3
5	Analyses	2
6	Results	4
7	Limitations	4
8	External Validity	3
9	Antagonistic Bias	2
10	Economic Evaluation	18
	Total	44
6.5	Implementation Science Standards	
1	Program Description	2
2	Delivery Arrangements	2
3	Governance arrangements	2
4	Financial arrangements	3
5	Research evidence	2
6	Health Information Systems	2
7	Evaluation of implementation activities	4
8	Sampling	1
9	Population/Context	2
10	Analyses	2
11	Results	4
12	Limitations	2
13	Reporting Bias	1
	Total	29

Step 4: Create tools to help with
structured evaluation, common
indicators moving forward

Develop Common Indicators and Measurement Standards for mHealth Projects



Does the Technology Work?

Metric Area	Indicators
Technical Factors	
Connectivity	% of target population with mobile phone signal at time of interview
Power	% of target population who have current access to a power source for recharging a mobile phone device
Skilled local staff	% of mHealth programs with current access* to local technical support for troubleshooting % of users who report having access to local technical support systems for troubleshooting
Maintenance Functionality	% devices that are not currently operational (misplaced/broken/not working) % of mobile devices that are operational in the language of the users
	% target population who are literate in the language used by the mHealth strategy % of target population who report ever use of Short Message Service (SMS) capabilities
Organizational Factors	% of data fields from original paper based system that technology captures
Training	Total hours of initial training attended by program staff in use and deployment of technology Total hours of refresher training attended by program staff in use and deployment of technology

*Access: Could relate to individuals on staff or outside support

Additional criteria to be considered at this stage include:

Needs Assessment: Does the platform address an identified public health need?

Software Considerations: Does the software comply with current industry standards?

Adaptability: Can the platform be adapted to incorporate different data needs? Can the platform be modified by locally available developers?

How do People Interact with the Technology?

Metric Area	Indicator
User Coverage	% of users who demonstrate proficiency in use of intended mobile application % intended users observed using the tool in preceding reference period of time No of transmissions sent by intended users over reference period of time % of transmissions successfully sent* in 'x' period of time
User Response	% of users who rate technology as "easy to use" % of users rating technology "transmits information as intended" % of users who report satisfaction with the content of health information received through mobile device % of users motivated/intend to use technology
User Adoption	% of messages/amount of data transmission sent from server that are responded to appropriately** by end user within reference period of time Number of messages/forms/amount of data transmission sent by end-user within reference period of time % of data fields/forms that are left missing/incomplete over specified period of time

*Successful transmission is reflective of the network coverage in the user area

** 'Appropriately' could refer to completion of intended action to reflect that the message has been read e.g. Acknowledgement of message

What are the claims you're trying to make ?

What indicators do you have to support these claims ?

What are the data sources for the indicators you have chosen ?

Are the data sources adequate to create these indicators ?

Do we need to readjust the claim or develop an M&E plan to improve data sources ?

Innovations CATALYST

Innovate•Evaluate•Scale up•Improve health



INNOVATE
EVALUATE
SCALE UP
IMPROVE
HEALTH RESEARCH
LIMATE SCALE UP
ROVE INNOVATE
LIMATE SCALE UP
PROVE HEALTH

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Supporting pregnant women and new mothers in South Africa Cell-Life's MAMA SMS

Despite very good coverage of antenatal care and over 94% of deliveries being attended by a skilled birth attendant, the maternal mortality ratio in South Africa is estimated at 310 deaths per 100 000 live births (1). HIV prevalence is also high among women of childbearing age: 27% of women aged 20–24 years are HIV-positive, as are 33% of women aged 25–29 and 29% of those aged 30–34 (2). Prevention of mother-to-child transmission of HIV (PMTCT) can be over 95% successful if HIV-positive pregnant women and mothers follow the treatment regimen and stay in the programme (3). However, due to heavily burdened systems, antenatal care and PMTCT programme face many challenges as they work to provide women with support and follow-up care. More support is needed to strengthen PMTCT programmes, encourage HIV testing and treatment, and avoid loss to follow-up.

The MAMA SMS service is an evidence-based free messaging service that extends the support provided at health facilities, providing pregnancy, postnatal and baby care information to women. The service aims to help keep women healthy throughout their pregnancies and to encourage HIV testing and adherence to PMTCT programmes.

How MAMA SMS works

The MAMA SMS service is available free to pregnant women and those with babies aged up to three months. The service is advertised using posters and pamphlets at health facilities, and health-care workers are trained to explain the service to clients, who can then register using their mobile phones. Sixty SMSes are sent to each woman in her preferred local language, among them Zulu, Xhosa, Sesotho, English and Afrikaans. The content of the messages is based on an extensive literature review including WHO and South African Government protocols, interviews with experts, and focus group discussions with South African women. Themes include: clinic attendance, HIV testing, preparing for birth, mother–infant bonding, breastfeeding, hygiene, infant illness, lifestyle, medication adherence, nutrition, postnatal care, prevention of sexually transmitted infections (STIs), contraception, tuberculosis and vaccinations. A complementary PMTCT and HIV-prevention call-back service is advertised via the SMS service; registered clients can send a free ‘please-call-me’ SMS and a trained HIV counsellor from South Africa’s National AIDS Helpline will call them back. The MAMA SMS service is provided by Cell-Life, a not-for-profit organization, providing innovative technology and approaches for the management of HIV and other infectious diseases in South Africa.

Supporting national public health programming

Among the stated commitments of the South African National Department of Health are reducing maternal and child mortality, combating HIV and AIDS, and decreasing the burden of disease from tuberculosis. Within the health services, specific objectives include reducing vertical transmission of HIV, improving maternal health outcomes and reducing HIV transmission, in support of progress towards achieving Millennium Development Goals 4, 5 and 6 (4). The MAMA SMS service is designed to enhance the health-care services offered during the antenatal and postnatal periods, with an emphasis on HIV prevention and PMTCT. It supports all four national prongs of PMTCT, namely: primary prevention of HIV in women of reproductive age; prevention of unintended future pregnancies among women living with HIV; ensuring access to antiretroviral drugs that will improve women’s health and prevent HIV transmission to babies during pregnancy, delivery and breastfeeding; and provision of integrated HIV care, treatment and support for women and their families.

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SMS printers aid early infant diagnosis of HIV/AIDS in Nigeria CHAI's SMART



Half of all infants born with HIV will die before they reach two years of age if left untreated. Early infant diagnosis and immediate treatment with antiretroviral therapy (ART) are critical (5). Despite a dramatic, eight-fold increase in early infant diagnosis across sub-Saharan Africa since 2006, the 2009 *Children and AIDS: fourth stocktaking* report showed that almost 50% of infants tested for HIV never receive their test results (2). Early infant diagnosis of HIV requires a sophisticated virological test (PCR) that can only be performed at a handful of laboratories in Nigeria, creating challenges for communicating the results back to the health facilities and thus delays in providing timely treatment.

To address these challenges, the Clinton Health Access Initiative (CHAI) partnered with two engineering companies to develop a new technology – SMS printers – that can strengthen early infant diagnosis services by reducing the turnaround time for test results by more than half.

How SMART works

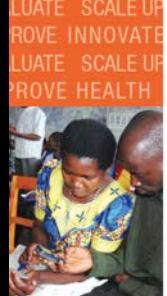
SMART stands for ‘SMS Printers to Accelerate Return of Test Results for Early Infant Diagnosis of HIV/AIDS’. The SMART programme addresses a critical barrier to early infant diagnosis (EID) by leveraging simple mobile technology and design to more rapidly communicate HIV test results from the laboratories back to the health facilities. Nearly every district in Nigeria has network coverage for mobile telecommunications, even in remote areas lacking roads and electricity. Using mobile SMS technology and small, battery-operated printers, health facilities can receive and print EID test results without having computers and Internet access and without waiting for a hard copy to be delivered. Operation of the SMS printers can easily be taught to unskilled health workers in very remote areas. These devices require limited maintenance and only thermal paper as a consumable. The ability to instantly transfer results from the lab to the health facility via SMS has been demonstrated to reduce turnaround time significantly, thereby helping caregivers and clinicians to promptly initiate life-saving ART and resulting in fewer infants being lost to follow-up (3).

Supporting national public health programming

In Nigeria, there are an estimated 230 000 HIV-positive pregnant women who are at risk of infecting their babies in the absence of adequate care. The Government of Nigeria, in collaboration with a range of partners, is coordinating an aggressive response by scaling up prevention of maternal-to-child transmission (PMTCT) programmes. In partnership with the Federal Ministry of Health, CHAI is expanding the SMART programme to keep pace with the rapid expansion of early infant diagnosis in Nigeria, which has grown from 745 tests in 2007 to over 38 000 in 2011. The SMART programme addresses one of the primary objectives of the national PMTCT scale-up plan (2010–2015): to ensure that at least 90% of all HIV-exposed infants have access to early infant diagnosis services (4). Beyond enabling progress towards this target, the SMART technology also provides aggregated data across all sites where SMART has been implemented; this will allow the Government to track PMTCT performance indicators nationally once the programme has been scaled up.

* PCR = polymerase chain reaction

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World Health Organization
mHealth Alliance

Assisting community health workers in Rwanda MOH's RapidSMS and mUbuzima

The Ministry of Health (MOH) of Rwanda has made remarkable gains in maternal and child health. The maternal mortality ratio has been reduced from one of the world’s highest in 2005 at 750 deaths per 100 000 live births down to 487 in 2010, and the under-5 mortality rate has been reduced by half during the same period (1,2). To achieve these results, national policy has focused on improving community-level health care through community health workers (CHWs).

Approximately 45 000 CHWs have received training in how to monitor and promote maternal and newborn health, identify potential risks and promote antenatal care at health-care facilities. However, these CHWs often work in remote areas, without communication tools.

To strengthen community-level and facility-based maternal and child health interventions, the Rwanda MOH, in partnership with UNICEF, has launched an mHealth system – comprising RapidSMS and mUbuzima – to track pregnant women and newborns, promote early detection of life-threatening emergencies, and facilitate reporting on community-level indicators relevant to Millennium Development Goals 4 and 5.

How RapidSMS and mUbuzima work

The first component of Rwanda’s mHealth system, RapidSMS, provides a simple text-messaging tool that CHWs can use to conduct routine surveillance of health events during the course of a woman’s pregnancy, delivery, and for the first year of her infant’s life. Automated, actionable responses are sent to CHWs when reported events indicate risk, or when antenatal care visits or deliveries are due. Similarly, health facilities are notified to prepare for an anticipated delivery or to provide ambulance transport. The second mHealth component, mUbuzima, uses interactive voice response (IVR) technology to enable CHW team leaders in each village to submit data on a monthly basis relating to case management of sick children, nutritional status, vaccinations, supervision, maternal health and deaths at home. Together, these two components facilitate real-time decision-making through the aggregation of data into charts and dashboards, and contribute to the national monitoring of the MDG indicators for maternal and child health.

Supporting national public health programming

As part of the Government of Rwanda’s tremendous effort to reduce maternal and newborn deaths, it has launched several major initiatives to provide basic health services to women and children. These initiatives include Emergency Obstetric and Newborn Care (EmONC), Integrated Management of Newborn and Childhood Illness (IMNC), and Integrated Community Health Packages. The MOH’s mHealth system strengthens these innovative programmes by equipping CHWs with tools to better monitor and respond to health events and better connect women and children with health facilities. MOH monitoring data for Musanze District for the year immediately before and after the mHealth pilot project began (June 2010) indicated positive results: an increased proportion of facility-based deliveries, an increased number of first antenatal care visits, and reduced numbers

* MDG 4 is to reduce child mortality; MDG 5 is to improve maternal health (www.unmillenniumproject.org/goals/gt.htm)

World Health Organization
mHealth Alliance





INCREMENTAL CHANGE

DISRUPTIVE INNOVATION

Degree to which the mHealth strategy changes the status quo

DIFFICULTY OF SCALING

COMPLEXITY OF ENGAGED ECOSYSTEM

INSTITUTIONAL / HEALTH SYSTEM INERTIA

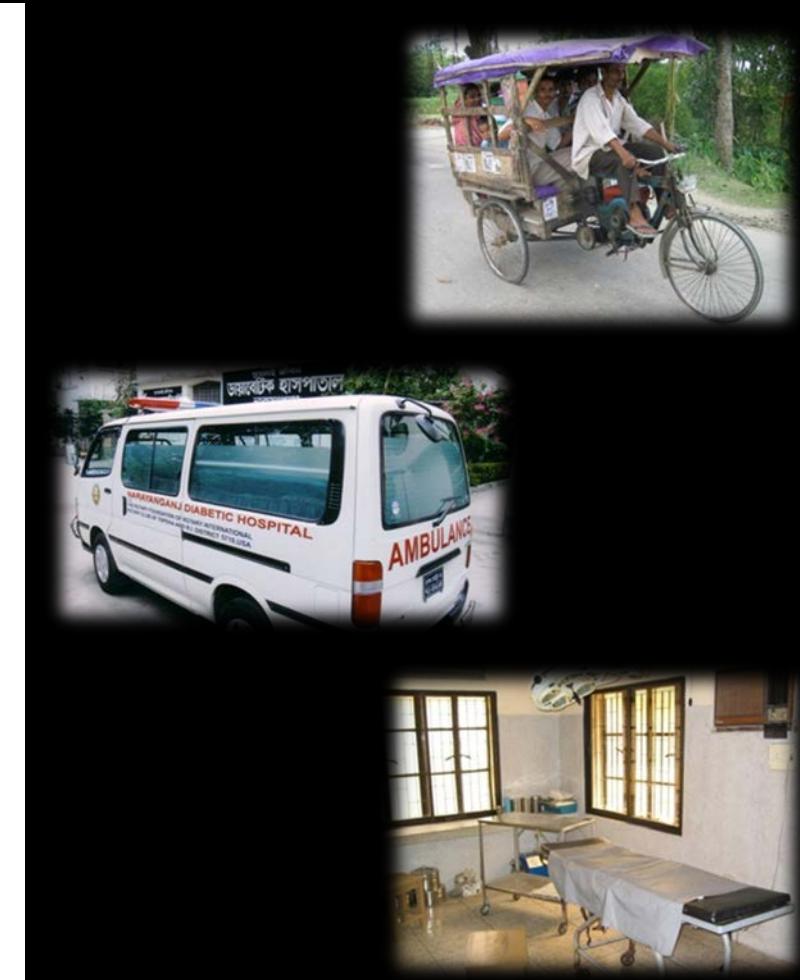
Case Study 1: A Systems Approach

Rural families use mobile phones during severe pregnancy crises

N=11,451 (2007-2010)

	Number	%
Total number of "Near Miss" events	611	5%
<i>Those using mobile phones</i>	337	55%
[†] Phone used to:		
call provider	241	72%
request medical advice	193	57%
arrange transport	110	33%
request financial aid	70	72%

[†]Total greater than 337. Categories are not exclusive.



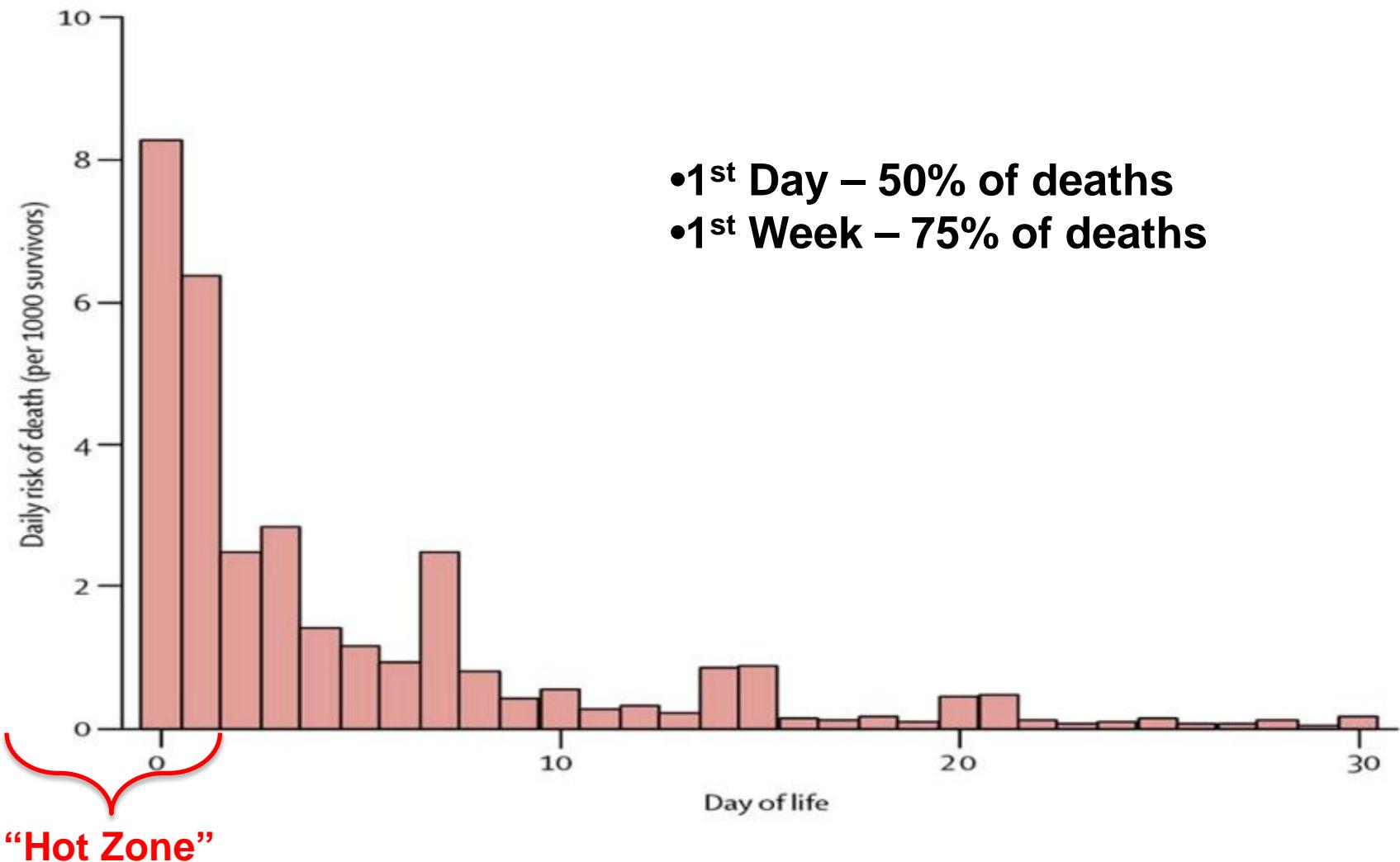


168,231 Woman Survey –

Gaibandha, Bangladesh
(January-March 2012)

- **71% Households own phones**
- **20% Used a phone in past 30 days for emergency health purpose**
- **Phone owners 2.8 times more likely to use phone for health call**
- **ONLY 23% Electricity in home!**

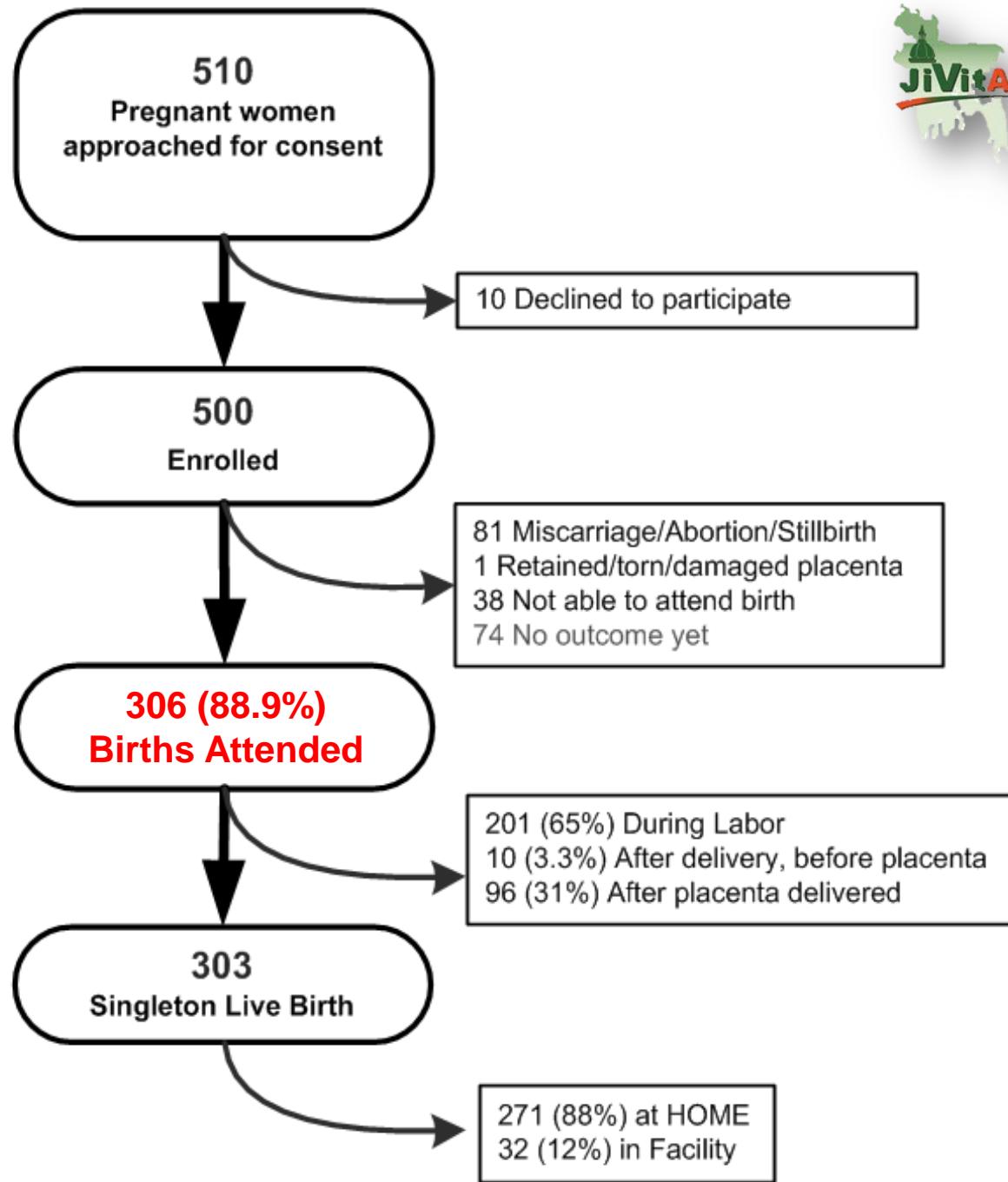
Challenges in averting neonatal mortality – being at the right place, at the right time...



Source: Lawn JE et al Lancet 2005, Based on analysis of 47 DHS datasets (1995-2003), 10,048 neonatal deaths)

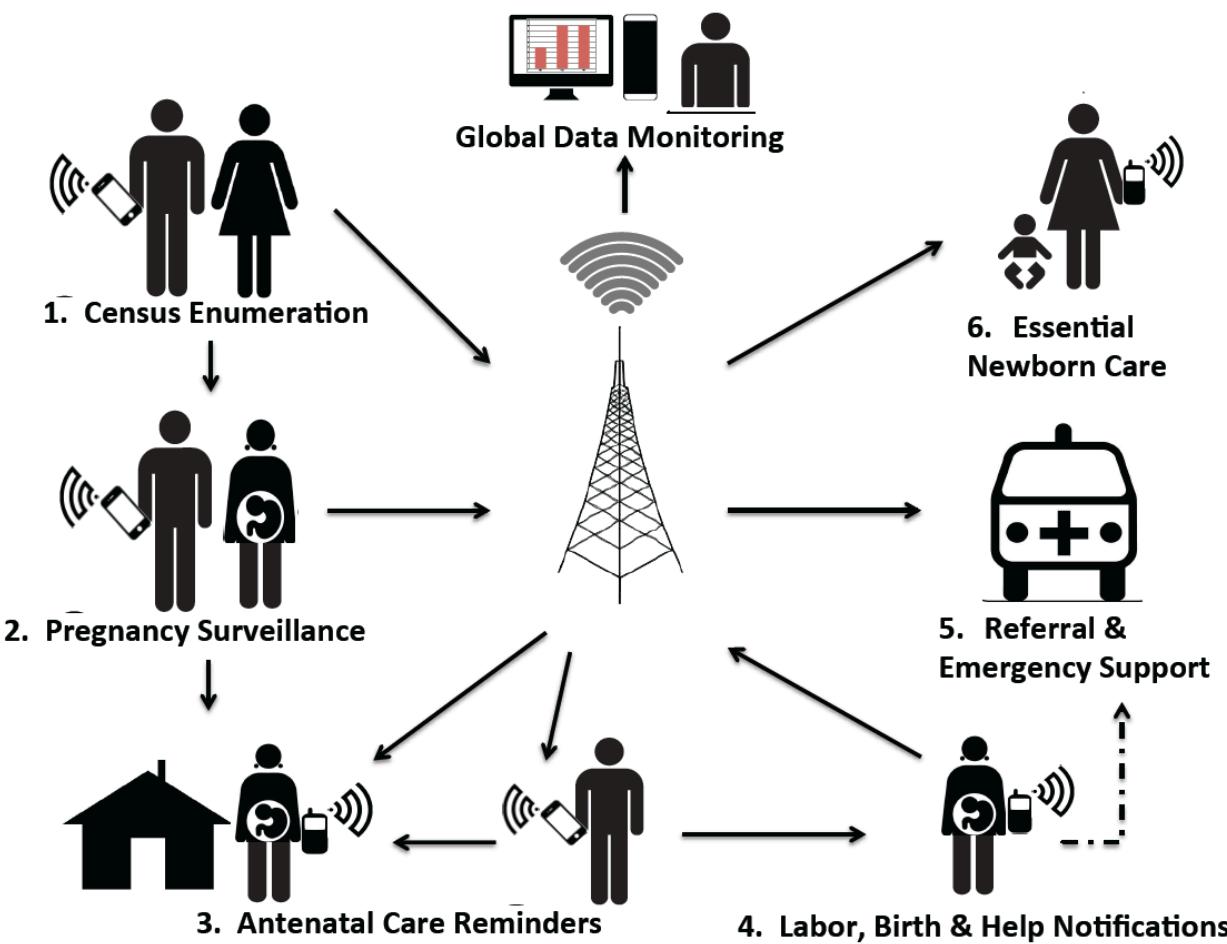


m-Labor Notification System Pilot Study



Source: Gernand, JiVitA Data 2011
(Unpublished)

mCARE: Community-Health Worker System to improve delivery of ANC/PNC and increase client demand



World Health Organization

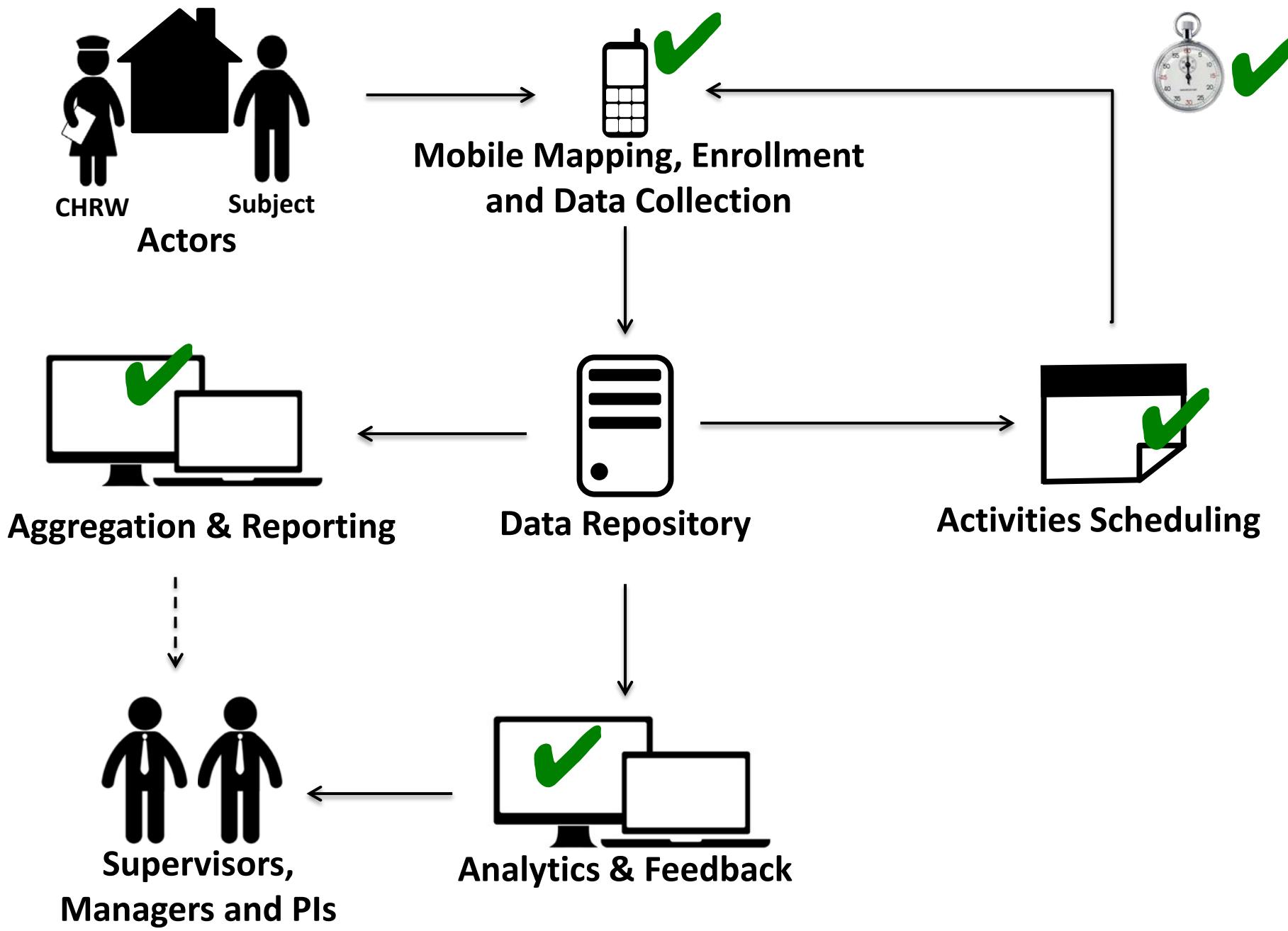
mPower

JOHNS HOPKINS UNIVERSITY
Global mHealth Initiative

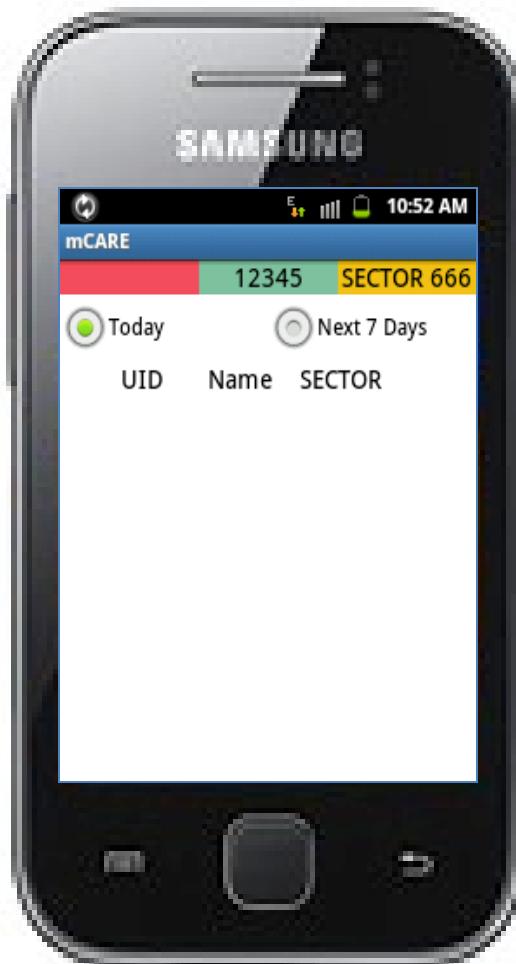
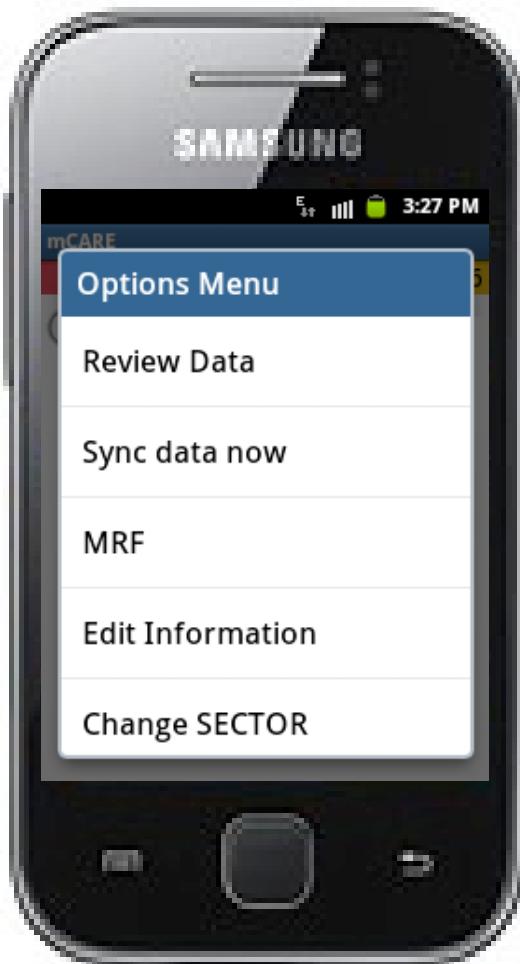
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SCHOOL OF PUBLIC HEALTH

UBS

UBS Optimus Foundation



Smart Scheduling of Daily Activities, by Priority





SAMSUNG

Pending : 0

Today : 0

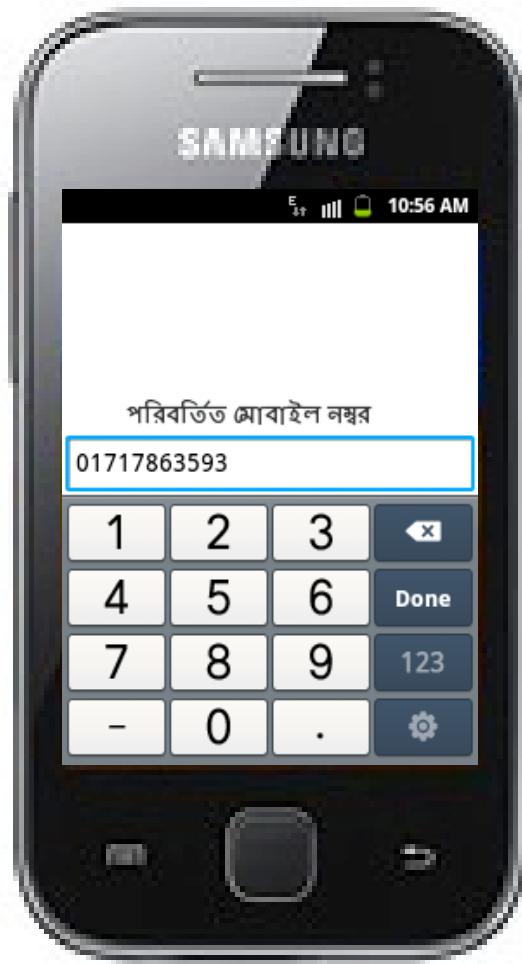
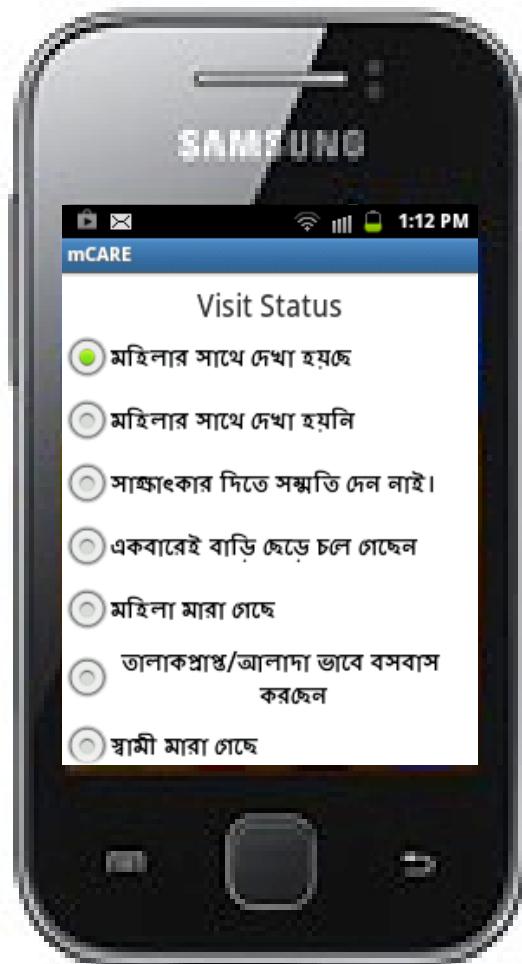
Birth Notification : 0

Sector Wise Visits

Sector Pending Today Birth Cons

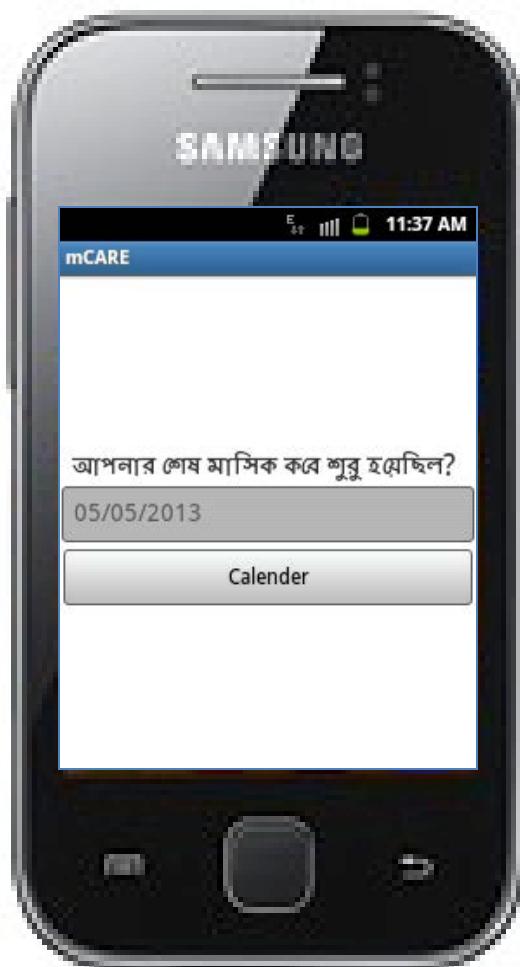
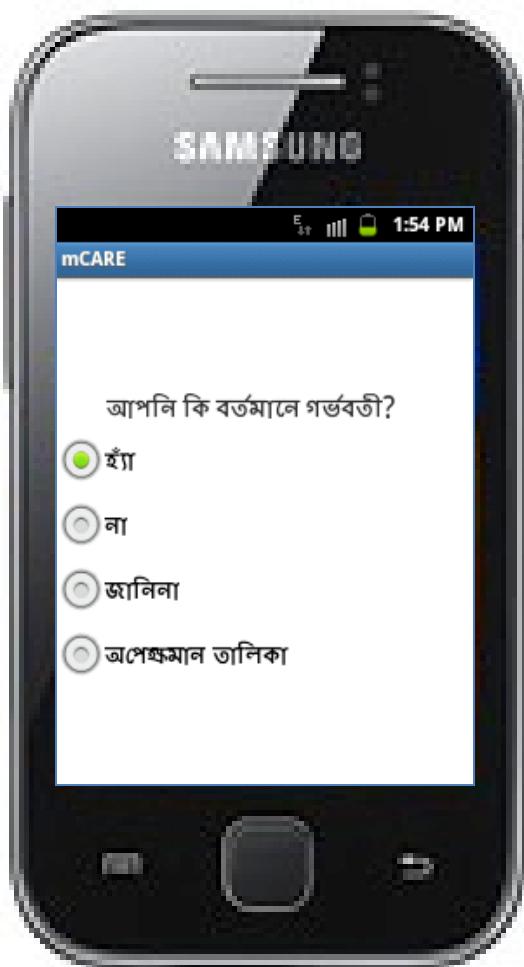
<input checked="" type="checkbox"/>	11	7	0	0	1
<input checked="" type="checkbox"/>	12	6	0	0	1
<input checked="" type="checkbox"/>	13	2	0	0	2
<input checked="" type="checkbox"/>	14	8	0	0	3

Census Enumeration





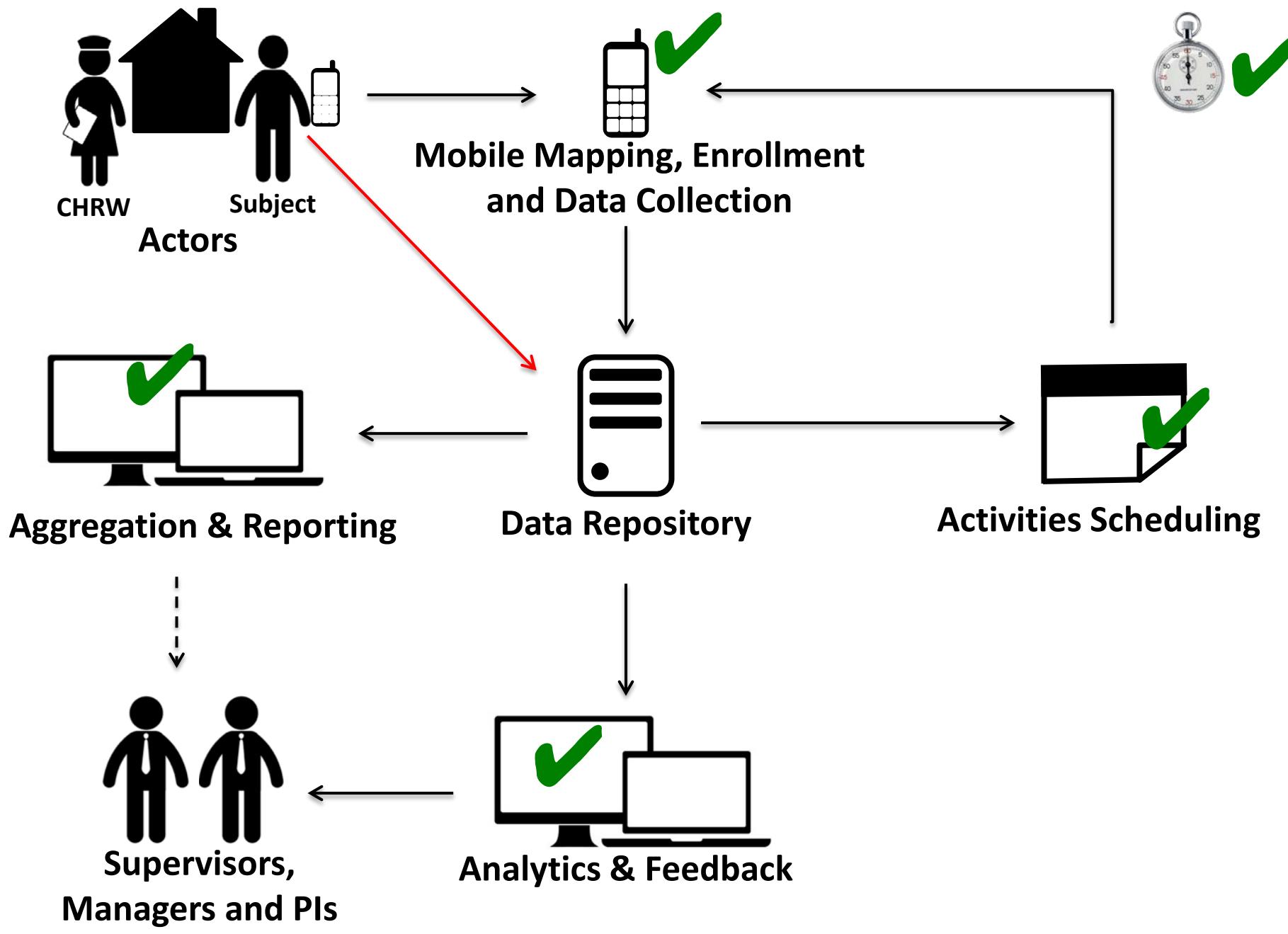
Assessing pregnancy status



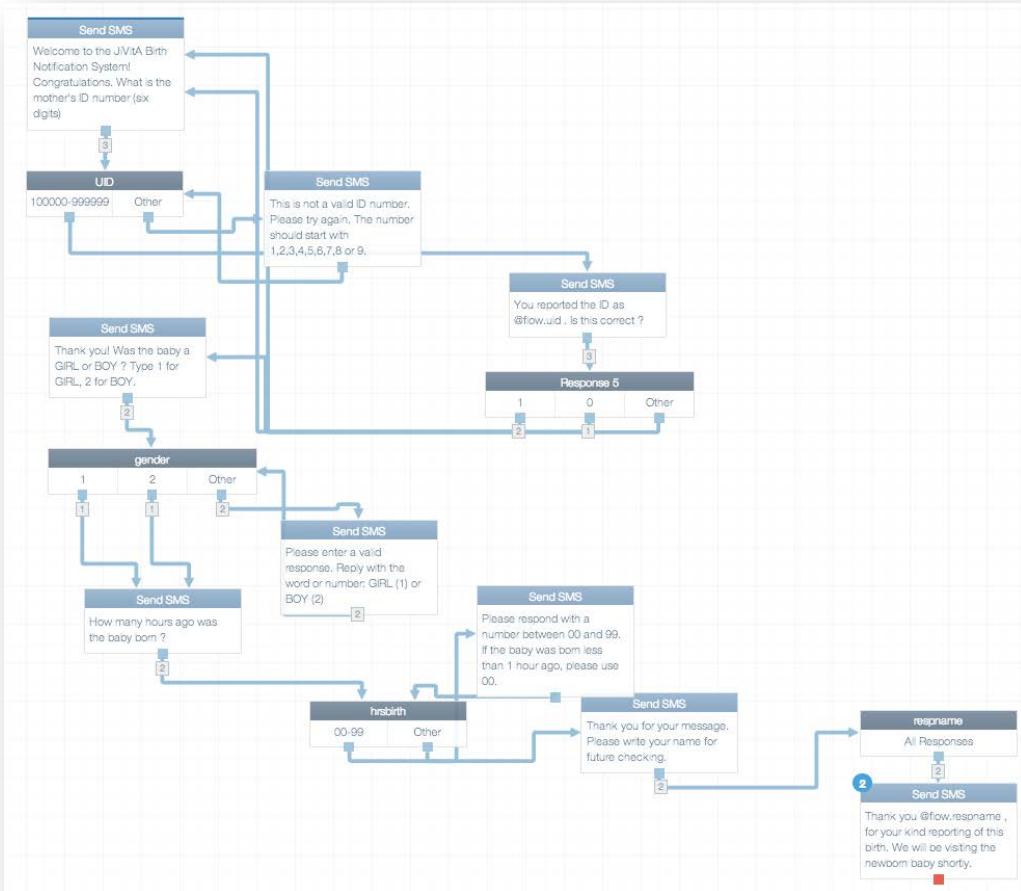


Potential cost-savings for ONE task = 13 FTEs !

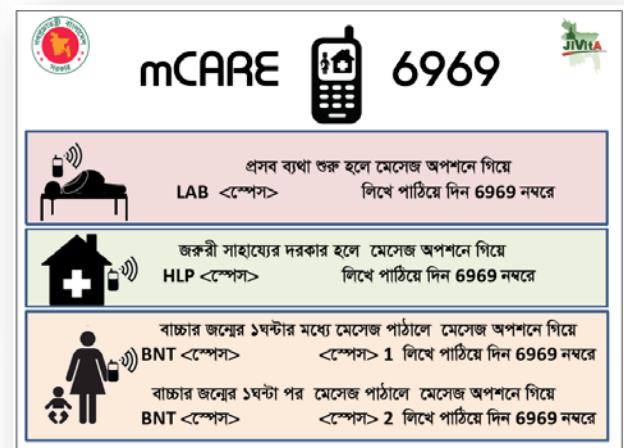
Format	Time to Complete	Population Size of Women of Repro. Age	Number of Visits per Year	Total Time Spent (hrs) per year	Time per worker (hrs, n=596) per year	Time per worker (work days, 8hrs)
Paper	8 minutes per encounter	X 140,000 X	1 per 5 weeks = 10.4	/60 = 194,133	326	41
Mobile	5.5 minutes per encounter	140,000	1 per 5 weeks = 10.4	133,467	224	28
Difference	2.5 minutes	-	-	60,666	102	13



Birth Notification in “real-time”



Try it:
Text / SMS
“birth” to
1(443) 393-2228



Online Secure Monitoring Dashboard

Dashboard 1 Dashboard 2

Geo Map Pregnancy

About Tableau maps: www.tableausoftware.com/mapdata

Pregnancy Status

Total N
500

Pregnancy Period

- 1st Trimester
- 2nd Trimester
- 3rd Trimester

Summary Report

Event	Month of Date		
	February	March	April
No of ANC-1 Visit	6	16	3
No of ANC-2 Visit	6	9	3
No of ANC-3 Visit	3	6	
No of ANC-4 Visit	4	5	1
No of ENCC Scheduled	48	82	17
No of MACF Scheduled	14	19	10
No of MEAF Scheduled	56	91	18
No of MPCF Scheduled			1
No of MWRA Registered	4	14	4
No of NBNF Scheduled	8	13	2
No of PNC-1 Visit	1	1	
No of PNC-2 Visit	1	1	1
No of PNC-3 Visit			1
No of Pregnant Woman	9	17	2
No of PSF Scheduled			2

AC Area/Union
(All)

TL PIN
(All)

GoB Ward No
(All)

Sector
(All)

Date
2/12/2013 4/6/2013

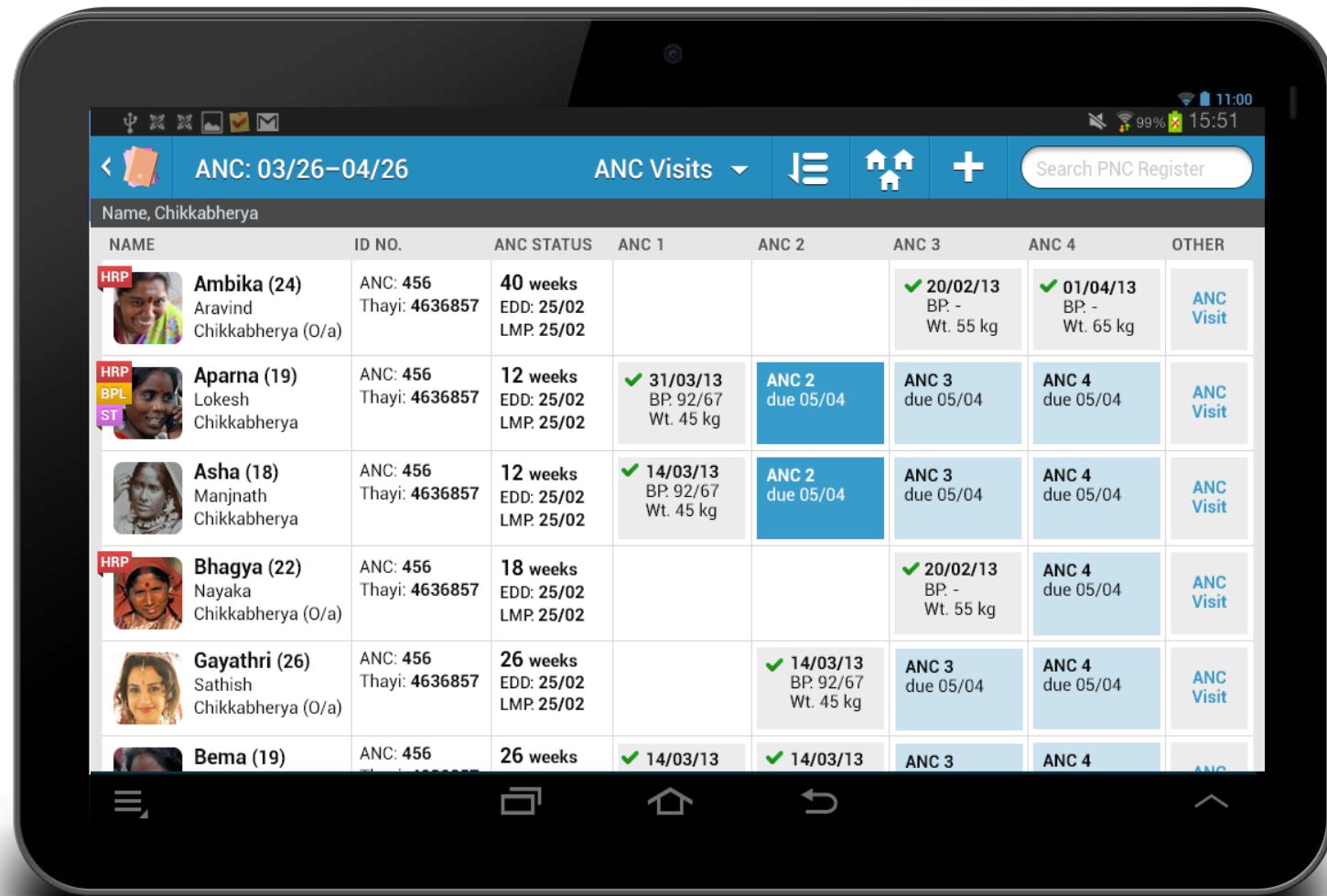
Mother Details

UID	Mother Name	EDD	F	Pregnancy W..
123452	Nasima Akter	2/4/2014	28	■
123453	Rima Begum	12/20/2013	10	■
123454	Koli Begum	3/25/2014	28	■
123455	Ms Noyon Tara	9/4/2013	9	■
123456	Mahbuba Akhter	3/19/2014	33	■
123457	Nasima Begum	12/26/2013	16	■
123458	Rohela Akhter	6/18/2014	35	■
123459	Chaina Begum	11/16/2013	31	■
123460	Selina Begum	4/1/2014	31	■
123461	Nasima Akhter	11/27/2013	19	■
123463	Rahima Begum	3/18/2014	37	■
123464	Hajira	12/17/2013	24	■
123466	Hawarunnesa	3/23/2014	24	■
123468	Rehana Begum	11/29/2013	6	■

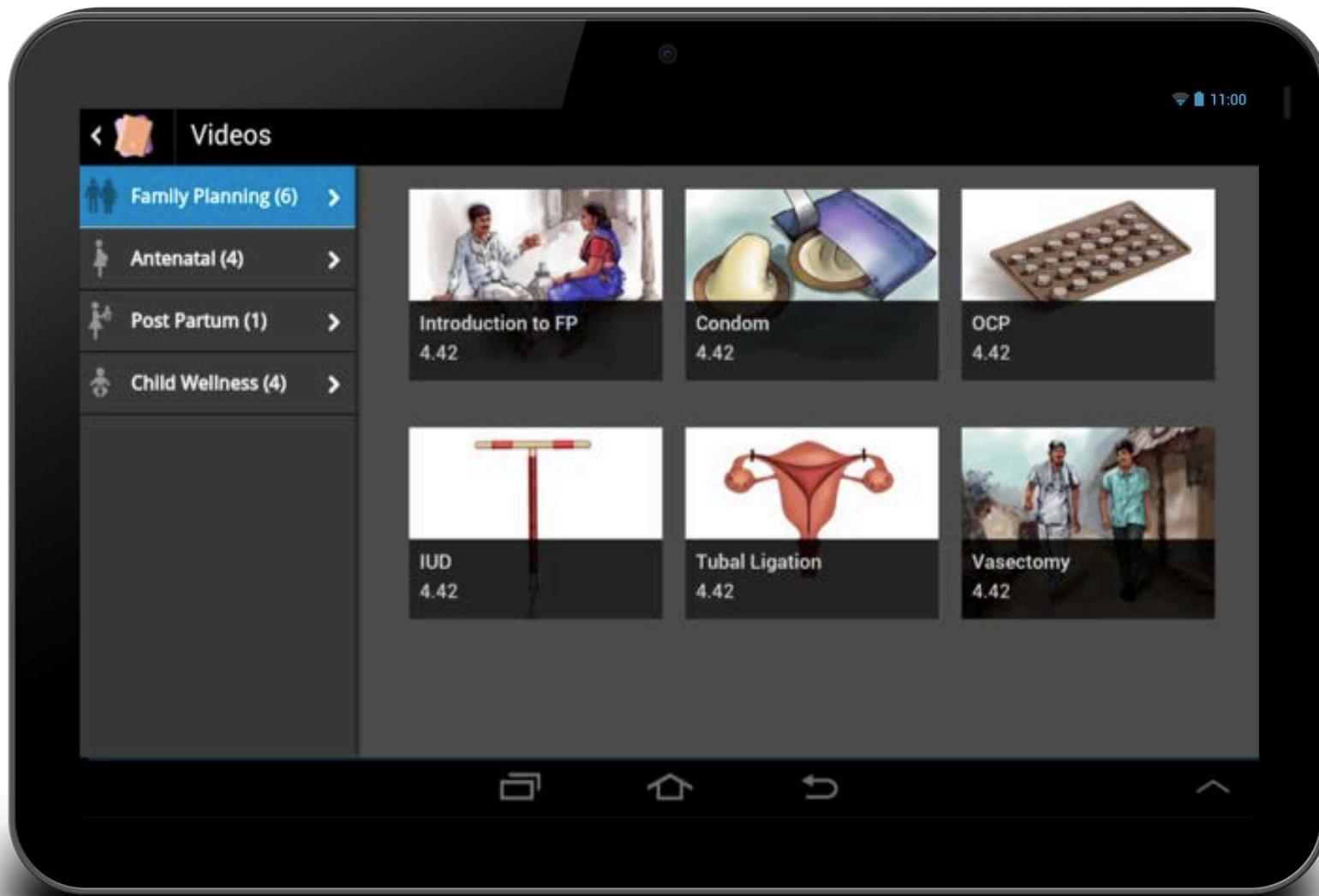
“Smart” Registries



Interactive Registries



Multimedia BCC / Counseling



Case Study 2: “Vertical” Systems Approach *(with a slight ‘horizontal’ twist)*

mTikka:

Virtual Vaccine Registry and Immunization Improvement System



BILL & MELINDA GATES foundation



Partners:



JOHNS HOPKINS UNIVERSITY
Global mHealth Initiative

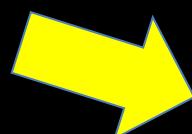
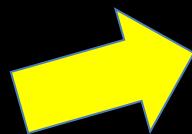


Lessons Learned

1. Mobile Health is not monolithic.
2. mHealth Evidence Ecosystem is growing
3. Emerging ‘best practices’: participatory design, end-user engagement, early stakeholder engagement
4. Need to define the value proposition(s) of the strategy – who will pay, for what, and WHY?
5. Stickiness is important ! (Good design / Fun / Incentives)
6. System-focused mHealth strategies need to integrate into or optimize existing workflows.
7. Shift from innovation in silos to ‘SYSTEMS’ integration
8. mHealth is a **uniquely** collaborative space. Use this truth to work smarter, faster, better (and sleep well at night).

Two last thoughts

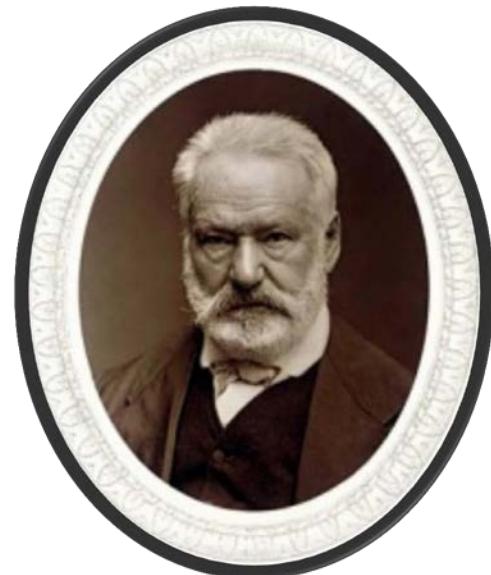
A phone... as a phone !



Victor Hugo

(1802-1885)

**“There is nothing more powerful
than an idea whose time has
come.”**





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alabriqu



jhumhealth

www.jhumhealth.org