mHealth for maternal health

bridging the gaps

7-8 April 2014 – Boston, Massachusetts

Meeting Report

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Executive Summary

In April 2014, 50 implementers, experts and donors from the mHealth and maternal health communities gathered in Boston for a meeting titled “mHealth for maternal health: bridging the gaps.” Throughout the two day meeting, the participants of this technical meeting grappled with the constraints to delivering high-quality, accessible and affordable maternal healthcare, discussed the opportunities for information and communication technologies to help alleviate those constraints, and outlined the beginnings of a shared “mHealth for maternal health” research agenda.

A prominent theme of the meeting was the need to improve the communication around the role of mobile technology in health as a pre-requisite for increased collaboration between mHealth and maternal health actors. Participants agreed that mobile technology should not be conveyed as a stand-alone health intervention, but rather a strategic tool for delivering maternal healthcare more effectively. The research questions posed by the group did not focus on whether mHealth works, but whether mHealth can deliver what already we know works better than we are currently able to.

The meeting began by positioning mHealth within a systems approach to achieving the goals of Universal Health Coverage: accessibility, affordability and quality. Participants reflected on the barriers and opportunities for operationalizing these goals, and the current and potential roles for mHealth within health systems. A logic model that links mHealth with improved health outcomes and a working mHealth vocabulary were shared and feedback was given. A cross-section of 15 different projects where mHealth is being used to improve maternal health by (1) increasing client knowledge, (2) improving provider competence, and/or (3) strengthening health systems was presented. The types of evidence that are useful for various stakeholders were discussed.

The meeting touched on many key themes. In particular, participants from both the mHealth and maternal health communities emphasized the importance of positioning health needs, not technology as the trigger for innovation. Mobile technology should not be considered an intervention in and of itself, but rather, a mechanism for delivering maternal health interventions more effectively within the context of the dynamic systems in which they operate. Many participants agreed that the proliferation of mobile technology creates new opportunities for overcoming health system barriers, but guidance on how to best measure and communicate the theory of change and results of mHealth for maternal health projects is needed. Evidence that mobile technology can improve the quality of maternal healthcare was considered a priority evidence gap by meeting participants.

The meeting was a first step in bridging the gaps that separate the mHealth and maternal health communities. Additional work on creating a shared mHealth for maternal health vocabulary, evidence agenda and funding streams is needed, all of which require sustained dialogue and increased collaboration between these two communities.

List of Acronyms

CHW – Community Health Worker

HSPH – Harvard School of Public Health

ICT – Information and Communication Technology

JHSPH – Johns Hopkins Bloomberg School of Public Health

mHealth – The use of mobile information and communication technologies for improving health

mTERG – Mobile Technical Evidence Review Group

MHTF – Maternal Health Task Force

RCT – Randomized Control Trial

UHC – Universal Health Coverage

WHO HRP – World Health Organization Special Programme of Research, Development and Research Training in Human Reproduction

Introduction

The major direct causes of maternal mortality – postpartum hemorrhage, pre-eclampsia/eclampsia, sepsis, obstructed labor and unsafe abortion – are well known, and largely preventable. Despite the availability of many evidence-based interventions for improving maternal health, the implementation of those interventions is often ineffective and seemingly intractable access and quality barriers leave too many women lacking the care they need. Increasing uptake of information and communication technologies in low- and middle-income countries, particularly of mobile phones, presents a unique opportunity to improve the implementation of effective maternal health interventions.

The use of mobile information and communication technologies for improving health, or mHealth, has emerged as a strategic approach and/or tool for operationalizing effective maternal health interventions by overcoming critical health system constraints. The rapid rise of mobile phones in many health systems constitute a new opportunities for implementers, researchers and providers of maternal health services, yet in contrast to this proliferation, the evidence base to support the theory that mHealth optimizes the delivery of high-quality maternal health interventions, lags behind.

New efforts to catalogue and grade this emerging evidence base are now underway. In order to disseminate these new learnings, share understandings, and discuss the future of mHealth for maternal health, increased dialogue between these communities was needed. The Maternal Health Task Force (MHTF) at the Harvard School of Public Health collaborated with the Johns Hopkins Bloomberg School of Public Health (JHSPH) and the World Health Organization Special Programme of Research, Development and Research Training in Human Reproduction (WHO HRP) to convene a technical meeting to discuss the ways in which mobile technology is currently being used to improve maternal health interventions through research and practice; to share the most up-to-date findings from efforts to systemize the mHealth evidence base; and to identify research gaps, as well as the next steps needed to bridge them.

This report summarizes the *mHealth for maternal health: bridging the gaps* technical meeting. In addition to this meeting, the MHTF also launched a Topic page on mHealth and an mHealth for Maternal Health blog series, featuring posts from experts in both mHealth and maternal health. Authors addressed some of the most pressing issues for mHealth for maternal health, including financing, "mHealth pilotitis," state of the evidence, and what's next in mHealth for maternal health, among other issues. The MHTF team used a number of online tools to share the meeting proceedings with the broader global health community in real-time. The MHTF engaged colleagues around the world on Twitter (#mh4mh), shared videos of meeting sessions, and used Storify to publish daily summaries of the meeting discussions. A graphic facilitator visually depicted the meeting's discussion on a Knowledge Wall.

Meeting Objectives and Goal

The meeting objectives were the following:

1. Bring members of the mHealth and maternal health communities together to bridge knowledge gaps by sharing research and programmatic work;

2. Discuss the most up-to-date state of the evidence of mHealth for maternal health efficacy, including logistics management and decision support for providers; and,

3. Identify the gaps in the evidence, and determine the next steps needed to bridge them.

The long-term goal of the meeting was to strengthen the linkages between the mHealth and maternal health communities.

Meeting Sessions

Day 1

Using mobile technology to strengthen dynamic systems and achieve Universal Health Coverage

The first day of the meeting began by positioning mHealth within the context of Universal Health Coverage, with particular emphasis on innovative strategies to improve access, quality and affordability through a systems-approach. An illustrative case study of a fictional rural health clinic outlined the access and quality barriers women and their families face when attempting to access maternal healthcare, including: difficulty reaching hospital, lack of continuity of care, commodity stock outs, no/poor implementation of evidence-based guidelines, an ill-functioning referral system, and communication gaps between facilities, providers, and families. The case study was grounded in the complex reality of weak health systems, showing the multiple and dynamic pathways where accessing and delivering care can be compromised, and asked participants to consider information and communication technologies as a potential option for building stronger systems.

Results from the pre-meeting survey reinforced that multiple, dynamic barriers compromise maternal healthcare at the system, provider and client levels. Low quality of care, low demand for services, financial constraints/cost, supplies and political will were the most frequently mentioned responses, with most of the barriers occurring at the systems level. The most frequently cited interventions to solve these problems were improving service quality, incentivizing health workers, training for skills and attitude, task shifting, and investing in infrastructure, human resources and services. The most common challenges for implementing these solutions were training, particularly in maintaining results, management and supervision, inadequate mentoring, top-down approaches, and donor reluctance to invest in infrastructure. Upon discussion of these results, participants emphasized the importance of:

- Coordinating fractured players within health systems,
- Collecting and applying data for real-time quality improvement,
- Reducing duplicative systems,
- Helping, rather than overburdening, physicians,
- Linking interventions at the facility level to work being done by CHWs, and,
- Distinguishing what types of evidence are most important for decision-making.

Defining the links between mobile technology and improved and health outcomes

A logic model was presented that mapped the relationship between mobile technology and more informed clients, more supported providers, strengthened systems, and improved maternal health outcomes. This session sparked discussion on whether mobile technology is a mediating or a moderating factor, the most effective ways of coordinating across sectors at the national level to implement interventions, and whether the real question we are trying to answer is not 'Does mHealth work,' but rather, 'Does mHealth improve our ability to implement what we know works?' Some early work on the development of a common mHealth for maternal health vocabulary was shared. Key points included the connections between the language used to describe mHealth and the terminology of the broader ICT world, the distinctions between an mHealth project, strategy and technology, and the burden of evidence for each. This logic model can be found in the Appendix.

The first afternoon session featured fifteen participants who presented their mHealth technologies, projects and/or strategies for improving maternal health, and the evidence they have collected thus far. This session provided concrete examples of mHealth for maternal health, a snapshot of what is new in the field, and communication on the breadth of technologies, projects and strategies currently being implemented, planned and evaluated across the globe. The presentations were grouped by whether they aimed to improve client access to services, improve provider competence, or strengthen systems. After theses presentations, each participant was asked to (1) prioritize the multiple, dynamic

constraints to delivering effective maternal healthcare using a health systems constraints framework, (2) reflect the level of confidence they have that an mHealth solution exists that should be part of the strategy for overcoming these constraints for each of their priorities and (3) discuss their decisions at their table, and then reflect on their discussion in plenary.

Priority constraints to delivering effective maternal healthcare, and the role of mobile technology

The session yielded a list of priority constraints to delivering effective maternal healthcare, and a list of which of these constraints participants felt there was a role for mHealth solutions. Top results were access to information or data, supply of commodities, health worker competence, and quality of care. Demand for services, addressing individual beliefs and practices, and health worker motivation were also considered top constraints to delivering effective maternal healthcare, but participants felt more evidence was needed to determine if mHealth should be included as part of the strategy. Overall, participants did not feel confident that mHealth can be included in a strategy to overcoming cost-related constraints to delivering effective maternal healthcare, in particular, client-side expenses. For a full list of results from this session, please see Appendix E.

Wrapping up Day 1, participants agreed that they wanted to continue discussing mHealth for maternal health by positioning maternal health, not technology as the trigger for innovation, making the linkages between mHealth and maternal health explicit, and exploring priority gaps in communication and evidence on Day 2 of the meeting.

Day 2

Day 2 of the technical meeting began with a participatory enumeration of the dynamic causes of maternal mortality and morbidity, leading to a working list of ideas about how mHealth can or could help deliver more effective maternal health care:

- Clinical processes, tools and guidelines to encourage adherence to evidence-based practices and support decision-making at the point of care. Examples include emergency obstetric care, Active Management of Third Stage Labor, and the partogram.

- Administrative processes, such as integrated supply chain management and referral coordination.

- Training and human resource management through electronic management and supervision systems to improve quality of care, and maintain results. Women-centered, respectful care must be central to these training systems and performance management systems.

- Digital civil registration systems and patient records to improve continuity of care, track outcomes and measure prevalence and incidence of mortality, and morbidities like fistula. They can also facilitate communication between registries and providers to integrate and align disconnected streams of data and be used to measure maternal health service delivery performance, inclusive of qualitative indicators.

- Increase demand for quality maternal health services by reaching women with individualized information, including links to facilities and emergency transportation. Importantly, mHealth can involve communities and families by teaching them danger signs during pregnancy, as well as follow-up after woman leaves a facility to prevent postpartum complications, such as sepsis. It can also solicit client satisfaction data and feedback to the facility.

Evidence: for who, and for what?

The sessions on evidence began with a presentation that discussed the role that evidence can play in shaping programs and policy, especially when donors, programmers and implementers make tough decisions about how to allocate scarce resources. It led to a discussion about the types of evidence required to make decisions about whether or not to incorporate mHealth as part of a maternal health strategy. Evidence was presented showing that SMS reminders have minimal or no effect on adherence to care when used in isolation of a broader strategy. Part of the discussion was about

the need to differentiate evidence that demonstrates the efficacy of mHealth functionality versus the efficacy of mHealth in improving the delivery of maternal health service. Demonstrating functionality needs a lower standard of proof than the evidence required to show the impact of an intervention that uses mHealth as an enabling tool. Randomized Control Trials (RCTs) were presented as the gold standard for gathering evidence based on their ability to eliminate selection bias and the impact of external changes. Important elements of an RCT include having an objective health outcome for even a small trial, along with qualitative components and understandings of uptake, fidelity of delivery, and observations. Although RCTs are often seen as expensive, and difficult and slow to implement, there are ways of cost-effectively and efficiently incorporating the principles of the RCT into the research design, such as through a step-wedge, cluster randomized design. Use of mHealth to deliver health interventions is in need of additional testing, whereas the ability of mHealth to improve efficiency of data collection may not require additional evidence.

The pre-meeting survey results showed that participants find many types of evidence compelling and useful when deciding whether or not to include mobile technology in their maternal health interventions. For example, many participants said they required evidence from across the mHealth maturity lifecycle in order to get a sense of the technology's stability, functionality, usability, efficacy and effectiveness. Other responses spanned a wide spectrum, ranging from rigorous trials with clear methodologies and controls, to a pilot that shows proof of concept, a clear logic model, demand from the user, process-related evidence, an understanding of fidelity, and replication. Participants also noted that the costs of the intervention, as well as evaluation needs, should be considered at the outset of the intervention.

Current state of the mHealth evidence base

The last session of the morning was a presentation of the current state of the evidence by representatives of the mTERG. The mTERG was formed in response to the low strength of evidence about the efficacy of mobile technologies in improving health service delivery and outcomes. In particular, despite hundreds of pilots, there was still a dearth of programmatic evidence. The focus of the evidence needed to shift from 'Does mHealth work?' to 'Does mHealth optimize what we know works?' and broaden to include additional sources of evidence in addition to peer-reviewed publications, such as gray literature and blogs. After conducting an extensive document review and eliminating many documents that failed to meet the quality standards of the reviewers, the strongest bodies of evidence were focused on (1) improving provider adherence to care and (2) reducing stock outs. The lack of evidence was apparent, signaling the need both for the generation of new evidence, as well as new standards for reporting that would include adequate description of the intervention, rigorous evaluation, and some standardized methods and indicators to harmonize the evidence base.

Identifying evidence and information gaps

These evidence gaps were explored in further detail through group work. A maternal health leader from each table was chosen to lead revolving discussions about the key information and evidence gaps in using mHealth to achieve improvements in maternal health. Many questions and gaps were identified, which this list outlines; for a full accounting of information and evidence gaps identified on Day 2, please see Appendix G.

Key research question: **How can mobile technology improve the quality of maternal healthcare?**

Several dimensions of quality were explored, including:

- **Human resource management**: How can mobile technology improve management and supervision? How can mobile technology improve provider competence, motivation and post-training skills maintenance?

- **Data collection and use:** How can mobile technology improve the quality of care data we are collecting at the population, facility and community levels? How can mobile technology mediate barriers to non-use of data in

facilities by increasing the efficiency and transparency of data collection? How can mobile technology collect data that improves accountability?

- **System and service integration:** How can we institutionalize mobile technology as a method of collecting complex data from multiple sources? How can mobile technology link multiple actors within health systems? How can mobile technology lead the way in service integration?

- **Obstetric emergencies:** How can we use mobile technology to improve obstetric emergency management?

Participants also identified a number of information gaps that requires increased collaboration and communication, most of which focused on understanding what factors should be taken into consideration when designing an mHealth strategy or tool. Participants would like more information on engaging end-users, the cost effectiveness of mHealth, and take equity into consideration, in particular.

Major Themes

1. Neither mHealth nor maternal health is monolithic. The development of new information and communication technologies, coupled with their increasing proliferation and accessibility, represent new opportunities to reach clients, families, communities and healthcare providers and alleviate health system constraints to delivering proven maternal health interventions. However, neither mHealth nor maternal health programs operate in a vacuum. mHealth should not be considered an intervention in and of itself, but rather, a mechanism for delivering maternal health interventions more effectively within the context of the dynamic systems in which they operate.

2. Health needs, not technology should be the trigger for innovation. The theory of change for implementing a mobile technology to deliver maternal health interventions should be clearly articulated, and its linkages to more effective, high-quality care should be made explicit.

3. Focusing on the user experience is key. Evidence about the existing systems, provider behavior, knowledge, attitude and skills, and client preferences will inform how best to design a mobile technology solution.

4. There is a language gap separating the mHealth and maternal health communities that needs to be closed. Currently the two communities often use the same words, but mean different things. From mHealth to quality, we need to be clear about our shared definitions and use them to appropriate applications of mobile technology for maternal health.

5. There is growing consensus that mobile technology can be leveraged to improve access to information, supply chain management, health worker competence and motivation, quality and continuity of care, and demand for services. However, more evidence is needed to determine how mobile technology can improve the quality of maternal healthcare.

6. When we think about producing evidence, we need to define the audience for whom the evidence is intended, and for what purpose. Advocates, policy makers, implementers and private sector actors may require different types of evidence, e.g. an RCT vs. usage patterns. Research needs to be reasonable, feasible and affordable.

7. mHealth for maternal health is a fast-moving field, and the evidence base is lagging behind. We need to be strategic about how we can gather evidence as we innovate, and with enough strength so as to be convincing. Increased collaboration between implementers and researchers is needed to build this evidence base.

8. As the diversity of innovations and applications grows, the development or adaptation of frameworks, taxonomies, vocabularies and reporting guidelines should be harmonized so efforts are not duplicated.

Conclusions and Areas for Further Development

Communication guidance: Guidance about how to communicate about mHealth for maternal health is needed in order to empower the maternal health and mHealth communities to effectively disseminate and advocate. This communication guidance should include a common working vocabulary, the logic of using mHealth to improve the delivery of maternal health services, and guiding principles for implementing information and communication technology in maternal health programs. Additionally, the communication guidance should contain comments on the existing evidence base on mHealth for maternal health, the health system constraints taxonomy, and other frameworks, mapping exercises and evidence syntheses that may be helpful. Members of both the maternal health and mHealth communities can use the communication for dissemination and to advocate for the appropriate use of information and communication technologies with donors, policy makers, implementers, and other decision-makers.

Reporting guidance: Guidance about how to report on mHealth for maternal health is also needed in order to build and harmonize the evidence base. The major shortfall in the mHealth for maternal health evidence is not in demonstrating effectiveness, but in providing an articulation of the technology, project or strategy's theory of change, implementation activities, and correlation with outcomes. Common indicators should also be developed. Members of both the maternal health and mHealth communities can use this reporting guidance to build the evidence base to be able to compare results and determine how to design more effective maternal health interventions.

Evidence agenda: Day 2 of the technical meeting resulted in the development of areas of focus and research questions that potentially warrant further exploration. This mHealth for maternal health evidence agenda should be developed further, and continue to involve members of both the maternal health and mHealth communities. The evidence agenda should be problem-focused, starting with the causes and drivers of maternal mortality and morbidity, and the known interventions that exist to mitigate them. It should also define the mHealth solutions that exist that could be implemented to deliver those interventions more effectively before identifying the gap in evidence and defining the research questions. The research approach would be outlined for the priority questions before they are refined, scored and pursued.

Ethics, cultural appropriateness and equity: It will be important to have continued discussion about the unintended consequences of mHealth; issues such as data protection and demand-generation for low-quality facilities, the trade-offs for using mHealth, the content of messages, and whether mHealth increases inequality by further marginalizing those without phones.

Funding: New methods for funding mHealth for maternal health need to be developed. This requires the dissemination of new communication guidance to donors in order to advocate for additional funding to build the evidence base. Cost comparisons between projects that use and do not use mHealth are needed. Pooled funding amongst multiple donors and an evaluation basket fund should be explored.

Next Steps

1. Meeting participants agreed to disseminate learnings from the meeting by sharing the discussion with their colleagues, incorporating the discussion into presentations, and contributing to blog series.

2. Meeting participants agreed to reach beyond their usual circles to continue to discuss the relationship between mobile technology and maternal health, build the mHealth for maternal health evidence base, and learn, share and collaborate with unexpected partners.

3. Implementers and researchers agreed to work together to improve the strength of mHealth for maternal health evidence, with specific emphasis on improving the articulation of projects' theories of change and impacts.

4. Representatives of the donor community agreed to explore new mechanisms for funding mHealth for maternal health projects, including funds for evaluating mHealth for maternal health projects.

5. Representatives of the mTERG agreed to apply the meeting's learnings to the agenda of their next meeting and follow-up on the input meeting participants had to the shared mHealth for maternal health vocabulary, and calls for standardized reporting and communication guidance.

6. The conveners of the meeting (the MHTF/HSPH, JHSPH and WHO HRP) will serve as an mHealth for maternal health secretariat to ensure that the discussion is continued, that the next steps captured here, as well as the individual commitments made during the meeting, are followed up on, and bridges between these communities continue to be built.

Appendix A: Steering Committee Members

1. Priya Agrawal, Merck for Mothers

2. Koku Awoonor-Williams, MoTech Ghana, Columbia University

3. Alain Labrique, with advisors Saiffudin Ahmed, Linda Bartlett, James Bontempo, and Blami Dao from the Johns Hopkins University and Jhpiego network

4. Ana Langer, Maternal Health Task Force, Harvard School of Public Health

5. Garrett Mehl, with advisors Christopher Bailey, Metin Gülmezoglu, and Özge Tuncalp from the World Health Organization

6. Marc Mitchell, Maternal Health Task Force, Harvard School of Public Health

7. Nick Pearson, Jacaranda Health

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Participant List

1. Kaosar Afsana, BRAC
2. Saifuddin Ahmed, JHU
3. Rifat Atun, HSPH
4. John Koku Awoonor-Williams, MoTeCH Ghana
5. Abdul Kalam Azad, Bangladesh MOHFW
6. Zubaida Bai, Ayzh
7. Christopher Bailey, WHO
8. Peter Barron, iAfrica
9. Linda Bartlett, JHU
10. Karen Beattie, EngenderHealth
11. Marcha Bekker, Praekelt Foundation
12. James Bontempo, JHU
13. Rebecca Braun, Ipas
14. Subhash Chandir, IRD
15. Alison Chatfield, MHTF
16. Chinedu Chugbo, Saving One Million Lives Nigeria
17. Brooke Cutler, MAMA
18. Blami Dao, Jhpiego
19. Shrey Desai, SEWA Rural
20. Caroline Free, LSHTM
21. Frederik Frøen, Norweigian Institute of Public Health
22. Mike Frost, JSI
23. Mengistu Hailemariam Damtew, Ethiopian FMOH
24. Judith Helzner, MacArthur Foundation
25. Kathleen Hill, URC
26. Alain Labrique, JHU
27. Ana Langer, MHTF
28. Kelly L'Engle, FHI360
29. Gwyneth Lewis, UCL
30. Neal Lesh, Dimagi, Inc.
31. Lesley-Anne Long, mPowering Frontline Health Workers
32. Yvonne MacPherson, BBC Media Action USA
33. Kathleen McDonald, MHTF
34. Sita Magnusen, Dpict
35. Marion McNabb, Pathfinder International
36. Patricia Mechael, mHealth Alliance
37. Garrett Mehl, WHO
38. Marc Mitchell, HSPH
39. Bethanne Moskov, USAID
40. Mojisola Odeku, JHUCCP Nigeria
41. Steve Ollis, D-Tree International
42. Nandini Oomman, Reproductive Health Consultant
43. Jonathan Payne, Merck for Mothers
44. Vandana Sharma, J-PAL, MIT
45. Lucy Silas, D-Tree International
46. Chaitali Sinha, IDRC
47. Breanne Squires, USAID
48. Tigest Tamrat, WHO
49. Özge Tunçalp, WHO
50. Olivia Velez, USAID/MCHIP
51. Ken Warman, BMGF
52. Mary Nell Wegner, MHTF

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MORNING SESSION		*FACILITATOR: Christopher Bailey*
8:00-9:00	**REGISTRATION AND LIGHT BREAKFAST**	
9:00-9:30	Welcome and overview of meeting Review agenda, objectives, and goal of the meeting	*Ana Langer* *Christopher Bailey*
9:30-10:30	mHealth within the context of Universal Health Coverage	
	Why take a systems approach?	*Kathleen Hill*
	Barriers to and opportunities for achieving Universal Health Coverage *Results from pre-meeting survey*	*Alain Labrique*
10:30-11:00	**COFFEE/ TEA BREAK**	
11:00-12:30	Bridging the language gap: developing a shared vocabulary	
	Linking mHealth with health outcomes	*Marc Mitchell*
	Taxonomy of mHealth interventions	*Garrett Mehl*
12:30-1:30	**LUNCH**	
AFTERNOON SESSION		*FACILITATOR: Christopher Bailey*
1:30-3:00	What's new in mHealth for maternal health	*See list of speakers*
3:00-3:30	**COFFEE/TEA BREAK**	
3:30-4:45	Matching mHealth solutions to maternal health problems	*Group work*
	Capturing group discussions on the Knowledge Wall	*Sita Magnusen*
4:45-5:00	Day 1 wrap up	*Christopher Bailey*
5:00-6:00	**RECEPTION**	

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MORNING SESSION		*FACILITATOR: Christopher Bailey*
8:00-8:30	**LIGHT BREAKFAST**	
8:30-9:00	Review of Day 1	*Christopher Bailey*
9:00-10:30	What kind of evidence do we have, and what kind do you want?	
	What do we mean by evidence?	*Caroline Free*
	What type of evidence is most compelling to you? *Results from pre-meeting survey*	*Alain Labrique*
	Current state of evidence	*Marc Mitchell* *Alain Labrique*
10:30-11:00	**COFFEE/ TEA BREAK**	
11:00-12:30	mHealth for maternal health: what do we know? What do we not know?	*Group work*
	Capturing group discussions on the Knowledge Wall	*Sita Magnusen*
12:30-1:30	**LUNCH**	
AFTERNOON SESSION		*FACILITATOR: Christopher Bailey*
1:30-3:00	Bridging the evidence gap: creating a shared research agenda	*Group work*
3:00-3:30	**COFFEE/TEA BREAK**	
3:30-4:00	mHealth for maternal health: what's next?	
4:00-4:30	Day 2 wrap up	*Sita Magnusen* *Christopher Bailey*

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Objectives and Goal:

The objectives of the *mHealth for Maternal Health*: *bridging the gaps* technical meeting are to:

1. Bring members of the mHealth and maternal health communities together to bridge knowledge gaps by sharing research and programmatic work;

2. Discuss the most up-to-date state of the evidence of mHealth for maternal health efficacy, including logistics management and decision support for providers;

3. Identify the gaps in the evidence, and determine the next steps needed to bridge them; and,

The overall goal of the meeting is to strengthen the linkages between the mHealth and maternal health communities.

Monday, April 7

Why Take a Systems Approach
It is increasingly understood that to improve maternal health has we need to improve health systems. mHealth is about improving health systems. This session sets the stage for why there is a shared goal between mHealth and maternal health and what are the implications for maternal health programming.

Pre-meeting survey results
As a starting point for this meeting we have asked all participants to respond to a survey to determine what you the experts see as the key constraints to delivering effective maternal health services. The survey included the following questions.

1. What do you consider the top 5 barriers to achieving universal access to high quality maternal health services
2. For each of these, what is the current most effective intervention that you know of? How effective is this approach? Is there an evidence base to support this intervention?
3. In what context and to what extent have you used mobile technology to address any of these barriers? Where these mHealth approaches successful. What did you learn from the experience?
4. What type of evidence is needed before you can consider a new approach as viable for programmatic integration? At what point do you say something is "evidence-based" ?
5. Please describe any context in which you have used mobile technology to address any of the barriers described above? Please include whether you found these tools to be helpful or successful, and what you learned from the experience.
6. What is one specific expectation you have from this meeting?

This session will focus on the **first 3 questions**

Achieving a Common Vocabulary

The goal of mHealth is improved health outcomes. This session presents a framework that was developed to look at the mechanisms through which this might occur, building on work done by WHO, the mHealth Alliance and others that led

to a logic model that will be presented. A simplification of the logic model is that mHealth is focused on changes in 3 basic areas:

The Client: These are interventions that are focused on enhancing the client's knowledge and her ability to use the health system effectively. These are primarily interventions such as text messaging, hot lines and reminders that can be tailored to the specific needs of the client and are often sent to the individual on their mobile phone.

The Provider: These are interventions aimed at improving the functioning of the workforce and include mobile applications that support training and planning as well as improving quality at the point of care through decision support, point of care diagnostics, referral tracking, and communications.

The System: These interventions address health systems performance and include improving the accuracy and timeliness of information, financial management using mobile banking, and logistics management.

From this basic model we will look at a more comprehensive model developed by WHO that is used to classify and grade work being done in mHealth and the related evidence to support the linkage between mHealth interventions and health outcomes.

What's New in mHealth for maternal health?
Because of the rapid pace at which mHealth is evolving, few practitioners have access to the full array of mHealth for maternal health interventions that are being successfully implemented. This session is a way to expose everyone to a broad array of interventions that are currently being used in the field. The presentations will all be done by participants so that follow up is possible on an individual basis with those presenting.

There will be 15 5-minute presentations.

Matching mHealth solutions to maternal health problems
This session will be done in groups with groups representing:

(1) client knowledge
(2) provider competence and
(3) health system performance

The task for the group will be to match health constraints with potential solutions in areas such as maternal hemorrhage, neonatal care, and demand for supervised delivery. After each group has an opportunity to identify ways in which mHealth can help address maternal health issues, their findings will be interpreted by a graphic interpreter and made part of the Knowledge Wall.

<u>Tuesday April 8</u>

What kind of evidence do we have, and what kind do you want?
This session will begin with a presentation of what we mean by evidence in terms of what are the standards used by publications and others for assessing "what we know."

Pre-meeting survey results
This will be followed by a presentation of the last 3 questions that were asked in the survey done prior to the meeting:

4. What type of evidence is needed before you can consider a new approach as viable for programmatic integration? At what point do you say something is "evidence-based"?
5. Please describe any context in which you have used mobile technology to address any of the barriers described above ? Please include whether you found these tools to be helpful or successful, and what you learned from the experience.
6. What is one specific expectation you have from this meeting?

Current State of the Evidence

For this meeting, two teams undertook a review of existing evidence in two domains of maternal health: (1) logistics management and (2) provider adherence to standards. The review used the methodology developed by the WHO mTERG using the taxonomy to classify articles and documents both published and unpublished and a grading system to assess the level of evidence that was found. Both the methodology and the data will be presented as well as some discussion of the role of the mTERG of WHO in advancing this agenda and its relationship to the outputs of this meeting.

What is the Evidence Gap?

Having discussed the potential uses of mHealth in supporting maternal health programs and the existing evidence to support its effectiveness, this session will begin the process of identifying evidence that is needed to know whether specific mHealth approaches will have the desired impact on maternal health. The questions that will be addressed during the remainder of this meeting are:

1. What are the promising areas for mHealth in maternal health for which more robust evidence is required? Who will identify the specific questions that need to be answered?
2. Who should be doing this research/generation of evidence? Academics? Implementers? Governments?
3. Who will fund this work? Will it be part of maternal health funding, mHealth funding, research funding?
4. How will we ensure that the research/evidence that is generated will continue to respond to the needs of the maternal health community?
5. Are the answers to these questions the same for areas such as child health or chronic disease in addition to maternal health?

A Shared Agenda

It is not enough to just answer questions; someone needs to do the work. How will the shared agenda that is developed during this meeting be implemented and how will this activity be communicated most widely. This session will focus on follow up plans for after this meeting and the roles of each of the players in ensuring that these plans are realized.

Appendix D: Pre-meeting Survey

1. What do you consider the top five barriers to achieving universal access to high quality maternal health services?
2. For each of these barriers, what is the current most effective intervention that you know of?
3. Is there an evidence base to support each intervention?
4. In your experience, how well is each intervention delivered?
5. What is the main challenge to effective coverage for each intervention?
6. What type of evidence is needed before you can consider a new approach as viable for programmatic integration? At what point do you say something is "evidence-based?"
7. Please describe any context in which you have used mobile technology to address any of the barriers you have listed.
8. What is one specific expectation you have from this meeting?

Presentations on the results of this survey can be found here.

HEALTH SYSTEM CONSTRAINTS

INFORMATION

- 4.1.1 Lack of population enumeration
- 4.1.2 Delayed reporting of events
- 4.1.3 Quality/ unreliability of data
- 4.1.4 Communication roadblocks
- 4.1.5 Access to information or data

AVAILABILITY

- 4.2.1 Supply of commodities
- 4.2.2 Supply of services
- 4.2.3 Supply of equipment
- 4.2.4 Diversity of treatment options

QUALITY

- 4.3.1 Quality of care
- 4.3.2 Health worker competence
- 4.3.3 Quality of Commodity
- 4.3.4 Health worker motivation
- 4.3.5 Continuity of care
- 4.3.6 Supportive supervision

ACCEPTABILITY

- 4.4.1 Alignment with local norms
- 4.4.2 Addressing individual beliefs and practices
- 4.4.3 Stigma

UTILIZATION

- 4.5.1 Demand for services
- 4.5.2 Geographic inaccessibility
- 4.5.3 Low adherence to treatments
- 4.5.4 Loss to follow up

EFFICIENCY

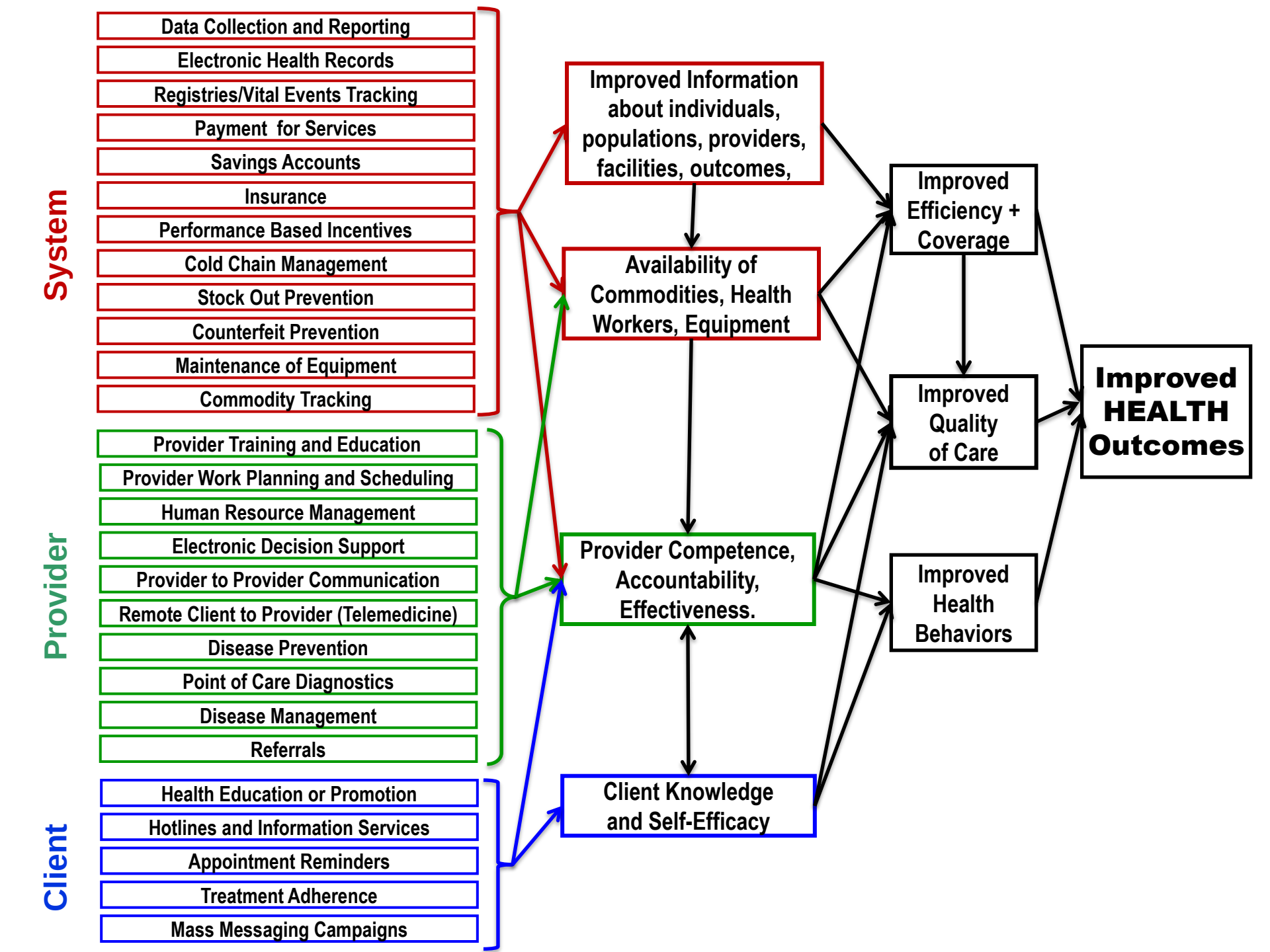
- 4.6.1 Workflow management
- 4.6.2 Effective resource allocation
- 4.6.3 Unnecessary referrals/ transportation
- 4.6.4 Planning and coordination
- 4.6.5 Timeliness of care

COST

- 4.7.1 Expenses related to commodity production
- 4.7.2 Expenses related to commodity supply
- 4.7.3 Expenses related to commodity disbursement
- 4.7.4 Expenses related to service delivery
- 4.7.5 Client-side expenses

Appendix E: Health Systems Constraints Taxonomy and Results from Day 1 Exercise

Definition	Top responses	Interpretation
A **green dot** indicated that participants think the constraint is a top priority for improving maternal health, and they were confident that an mHealth solution exists that should be part of our strategy.	1. Access to information or data (27) 2. Supply of commodities (16) 3. Health worker competence (13) 4. Health worker motivation (7) Quality of care (7) 5. Demand for services (6) Loss to follow-up (6)	Information, quality, availability, and utilization of services are all considered top priorities for the majority of participants, with high degrees of confidence that mHealth innovations exist that can be included as part of a strategy for overcoming these constraints.
A **yellow dot** indicated that participants think the constraint is a top priority for improving maternal health, but more evidence is needed to determine if an mHealth solution exists that should be part of our strategy.	1. Demand for services (8) 2. Supply of commodities (7) 3. Addressing individual beliefs and practices (6) 4. Health worker motivation (5) 5. Low adherence to treatments (4) Stigma (4)	Utilization, acceptability, availability and quality of services are considered top priorities, but more evidence is needed to determine if mHealth innovations exist that can be included as part of a strategy for overcoming these constraints.
A **red dot** indicated that participants think the constraint is a top priority for improving maternal health, but they are not convinced that there is a role for mHealth as part of the solution	1. Client-side expenses (5) 2. Health worker motivation (2) Continuity of care (2) Supply of equipment (2) Geographic inaccessibility (2) Supply of services (2) Expenses related to commodity production (2)	Cost and quality of services are considered top priorities, but some participants were not confident that mHealth innovations exist that can be included as part of a strategy for overcoming these constraints.


System
Data Collection and Reporting
Electronic Health Records
Registries/Vital Events Tracking
Payment for Services
Savings Accounts
Insurance
Performance Based Incentives
Cold Chain Management
Stock Out Prevention
Counterfeit Prevention
Maintenance of Equipment
Commodity Tracking
Provider
Provider Training and Education
Provider Work Planning and Scheduling
Human Resource Management
Electronic Decision Support
Provider to Provider Communication
Remote Client to Provider (Telemedicine)
Disease Prevention
Point of Care Diagnostics
Disease Management
Referrals
Client
Health Education or Promotion
Hotlines and Information Services
Appointment Reminders
Treatment Adherence
Mass Messaging Campaigns
Improved Information about individuals, populations, providers, facilities, outcomes,
Availability of Commodities, Health Workers, Equipment
Provider Competence, Accountability, Effectiveness.
Client Knowledge and Self-Efficacy
Improved Efficiency + Coverage
Improved Quality of Care
Improved Health Behaviors
Improved HEALTH Outcomes

Appendix G: Results of Day 2 Exercise – Information and Evidence Gaps

	Clients	Providers	Health Systems	Eco Systems
Design	What else does the client and/or health worker use the mobile phone for? How can a phone be used to register the # of pregnant women, their vitals, and the # of deaths and morbidities of pregnant women (including the causes) earlier and more accurately than existing systems? How can mobile phones enable the consideration of the community in service design? How do you engage the end users? What is the demand in private markets?	What is the role for mobile phones in supervision and incentive structures for Health Extension Workers in Ethiopia? How do you engage the end users?	How can we institutionalize e-health and information and communication technology tools? How do you integrate "mHealth" into broader health systems? What is the minimum package of health services which need to be in place for mHealth to work? How do you engage the end users?	What knowledge and knowledge sharing processes are helpful for policy making? What is the evidence of what works in other fields, such as behavioral sciences, communications science, and media studies? Can we link the 12 common applications of mHealth with the UHC framework (accessibility, quality and affordability)?
Data/Evidence	How can you plan to give mothers and babies unique numbers using mobile phones? How do these numbers integrate with other registration systems?	How can mobile phones strengthen supply chains? What is the relative benefit of mobile phones versus paper-based systems? How do you provide an integrated mobile solution for healthcare providers? Can mHealth lead the way in service integration?	How can mobile technologies facilitate bottom-up design, implementation and evaluation?	What is the use of real-time data? Is it sufficient? Do we know how to use it? What are the principles of implementation science we should use in mHealth for maternal health research? What reporting standards should we be using to share knowledge about the links between mobile phones and maternal health? What are the indicators? Who decides what is evidence? What do we do with it?
Implementation	What is the best way to use mobile phones to engage with women – and their families? Will men respond to	How can mobile phones monitor, audit and evaluate actions taken/promised? How can mHealth lead to actions, not words?	How can mobile phones collect complex national data, versus static numerators and	How can mobile phones assist in making data available that is useful to systems, providers and clients?

	education about danger signs? Do mothers-in-law need customized messages? What is the relative value of mHealth for behavior change, compared to home visits, community theater, billboards etc.? What is the role of social media?	Can mobile phones improve supportive supervision, with supervisors at a distance? Can learning and competence of providers be increased via mobile phones? How can healthcare workers be incentivized to access information and engage in learning through mobile technologies? Can mobile phones ensure that home births are as safe as possible? What are the skills and permissions that managers need to use and act on data?	denominators? How can we use mobile phones to collect more comparative media research? What is the role of mHealth in obstetric emergencies? How can mobile phones reach those who plan services locally with key planning data? How can mobile phones gather data for population disease surveillance? How can we use mobile technology to integrate systems? Is there a minimum, essential package of mHealth?	How can mobile phones help with gamification of maternal health problems? What contextual factors lead to successful implementation of mobile phones for improved health?
Quality	How can we use mobile phones to manage obstetric emergencies? How can mobile phones improve the quality of maternal healthcare?	Can mobile phones be used to improve quality of care through task shifting? How can mobile phones help providers do job better? How can mobile technology improve diagnostic accuracy? How does having a mobile phone enable healthcare workers keep up to date? How can mobile phones help with post-training skills maintenance? Which quality of care processes can mobile phones improve? How can mobile phones addresses healthcare worker apathy and	Does mobile messaging drive behavior change which leads to public health impact? How can mobile phones capture quality of care data beyond facility-readiness only, e.g. respectful care?	How can mobile phones help get us data for accountability?

		motivation? How can mobile phones provider client feedback to healthcare workers? Can mobile phones help providers know where and in what circumstances to refer women?		

While producing these research questions, participants identified several cross-cutting themes and open questions:

Ethics	Cultural Sensitivity/ Appropriateness	Equity/ Penetration	Cost Implications
What are the unintended consequences of mHealth? How do we ensure data protection for women? Are we generating demand for poor quality services? Contributing to overcrowding? How are we using mobile technology to incentivize clients and providers? How are we using GPS tracking on providers?	By using mobile technology, are we losing the benefits of personal interaction? What is the content and timing of SMS messages to women? Who receives them? What is the follow-up?	Does mHealth increase inequality by further marginalizing those without mobile phones?	What is the relative advantage of technology solutions, and are they cost effective in comparison to the status quo and alternatives? What do we mean by "cost effective?"

Appendix H: The Knowledge Wall

Sita Magnusen depicted the meeting's discussion on a "knowledge wall," captured below and accessible online here.