MAMA

Mobile Alliance for Maternal Action

Research Agenda

2015

Acknowledgements

On behalf of the entire Mobile Alliance for Maternal Action (MAMA) family, we want to thank the MAMA founding partners for their visionary leadership and support for the evaluation and research efforts undertaken with the MAMA Country Programs. We would especially like to thank the U.S. Agency for International Development, Johnson & Johnson, the Translating Research into Action Project, the World Health Organization's Innovations Working Group as well as the Johns Hopkins Bloomberg School of Public Health for their financial and/or advisory support of these research studies.

Recognition is due to all of the MAMA research and evaluation partners for their tireless efforts in carrying out these studies, including International Centre for Diarrhoeal Disease Research, Bangladesh (icddr,b) Wits Reproductive Health and HIV Research Institute (South Africa) and The Foundation for Research in Health Systems (India). Special gratitude also goes to Dr. Patricia Mechael at the United Nations Foundation for her vision and guidance in the research study designs and in the development of this research agenda.

We would also like to acknowledge the lead implementing partners of the MAMA Country Programs, who have worked closely with the research partners to ensure that the design and methodologies used are in line with the program strategies and goals. They are: Dnet in Bangladesh, Praekelt Foundation in South Africa and Advancing Reduction in Mortality and Morbidity of Mothers, Children and Neonates (ARMMAN) in India.

Founding partners:

USAID FROM THE AMERICAN PEOPLE · Johnson & Johnson · UNITED NATIONS FOUNDATION · babycenter

Implementing partners:

PRAEKELT FOUNDATION · dnet · armman

Research partners:

USAID FROM THE AMERICAN PEOPLE | TRANSLATING RESEARCH INTO ACTION · icddr,b · WRHI · FRHS

Contents

List of Acronyms

ANC	Antenatal Care
ARV	Antiretrovirals
Hb	Hemoglobin
HH	Household
IVR	Interactive Voice Response
KABP	Knowledge, Attitude, Behaviors and Practices
LiST	Lives Saved Tool
MAMA	Mobile Alliance for Maternal Action
MNCH	Maternal, Neonatal and Child Health
PMTCT	Prevention of Mother-to-Child Transmission
PNC	Post-natal Care
RCT	Randomized Control Trial
SMS	Short Message Service/Text Message Service
Tx	Treatment

Introduction

The Mobile Alliance for Maternal Action (MAMA) aims to improve the health and well-being of pregnant women and their newborns and infants through age- and stage-based messages delivered via mobile phones. The MAMA model is based on the expectation that women's and families' increased access to targeted health information will lead to improved knowledge, behaviors and practices, and in turn, those improvements will lead to improved health outcomes. Each of MAMA's three current country programs – Bangladesh, South Africa and India – has identified priority intermediate-level health outcomes related to change in knowledge, at-home preventive behaviors and seeking of health services that are measurable, relevant and within the realm of influence of each MAMA program.

In order to provide evidence of change through MAMA's programs, the MAMA Global team has been working with research partners in each country to develop rigorous study designs to evaluate MAMA's impact on priority health and behavior outcomes. The socio-cultural and health system contexts vary greatly throughout Bangladesh, South Africa, and India, resulting in distinct messaging content and implementation approaches. Relevant health and behavior outcomes have been prioritized and serve as the basis for setting the research agenda for each country program.

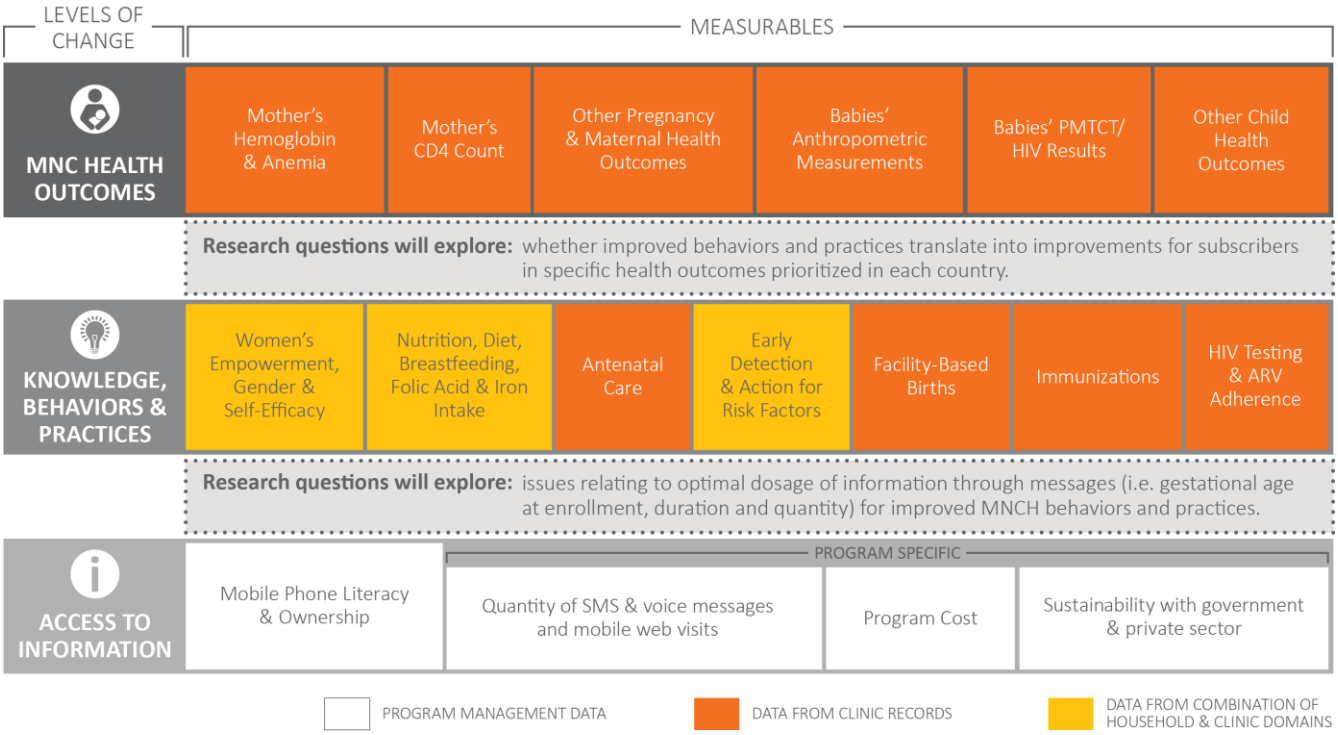
In this effort, local research institutions have been supported to design and lead independent impact studies. While initial formative research focused on usability, feasibility and user satisfaction, MAMA now has on-going and planned trials measuring targeted behavior and health outcomes in each country.

MAMA Levels of Change and Priority Outcomes

The MAMA program components and strategies in Bangladesh, South Africa, and India are maturing and the number of subscribers continue to grow. These programs offer optimal conditions to explore research questions on effectiveness in fostering behavior change. MAMA research teams have prioritized local health issues, domains and levels of change to be tested and explored by research partners. Figure 1 below maps the levels of change intended from a MAMA program along with the corresponding health issues and domains prioritized for research. It is a compilation of measurable health inputs, outputs, outcomes, and impact measures.

The base of the framework illustrates inputs and outputs related to increasing women's access to information. Research questions along this level rely on operational data collected through the delivery of the messaging program. Most formative research studies focus on this level, exploring questions of customer acquisition strategies, cultural appropriateness, trust, satisfaction, comprehension of messages, and peer promotion of the service. Most of the early MAMA research focused on this level of change and progress. Many additional questions on this level have not yet been explored but remain important to the mHealth sector, including: *What do best practices look like for linking or integrating with national health systems? What effect does subscribership in mHealth messaging programs have on mobile phone literacy and use of other mobile services, including mobile money*?

Figure 1: Levels of Change and Priority Outcomes



Formative research findings indicate that MAMA subscribers feel more confident and aware of health issues, needs and related services. However, the middle level of our framework has informed more questions that new in-depth studies seek to answer by linking knowledge, behaviors and actions. MAMA research teams have designed and are currently implementing studies to assess whether MAMA mobile messaging programs are affecting the health-related actions of new and expecting mothers. Emerging questions include: *Does increased awareness translate into improved self-efficacy? How are the messages used to support household-level discussions on health-related planning and actions? How are the messages affecting discourse on parental gender roles*?

The ultimate goal of any health behavior change effort is to improve behaviors known to reduce conditions and risks linked to death or a compromised quality of life. The top level of our framework highlights biological markers related to country-specific health priorities that each MAMA Country Program is designed to address. For South Africa, prioritized health outcomes primarily focus on the prevention of mother to child transmission of HIV (PMTCT). In India, the health priorities are related to anemia as well as child nutrition and growth. For Bangladesh, the health outcomes of interest cut across the maternal, newborn, and child health continuum of care. The research studies will track and compare changes in biological markers as key outcomes to assess effectiveness of the MAMA programs. All studies are designed to include statistically significant samples, scientific comparators and high confidence levels. Findings from MAMA Bangladesh and MAMA South Africa are planned to be shared in 2015, and India will follow in 2016.

Current Evidence

While there is general consensus on the potential of mobile messaging programs to improve MNCH and focus groups and one-on-one interviews show positive impacts, the mHealth sector still lacks rigorous, quantitative evidence linking mobile messaging programs to significant changes in behavioral, and more importantly, health outcomes. Among other things, this evidence gap limits the integration or mainstreaming of mobile messaging strategies into national health systems.[1]

In 2013, the US Government and UNICEF convened a summit of health communication experts to review evidence associated with population-level behavior changes necessary to advance child survival and healthy development in children under 5 years of age in low- and middle-income countries. A discussion paper followed in the *Journal of Health Communication* posits that there is evidence to demonstrate effectiveness in changing cognitive abilities, knowledge, and attitudes, but the evidence remains minimal for behaviors linked to child survival[2]. Below are the experts' recommendations based on their review of the evidence:

1.) Mobile messaging programs should be integrated with broader health systems programs; and
2.) Studies on program effectiveness and implementation science for optimal scaling should be prioritized for research.[3]

To track the evolving evidence on the effects of mobile messaging on MNCH, the MAMA Global team maps and ranks the evidence along a hierarchy of scientific rigor (See Table 1).

[1] Jo Y, Labrique AB, Lefevre AE, Mehl G, Pfaff T, et al. (2014) Using the Lives Saved Tool (LiST) to Model mHealth Impact on Neonatal Survival in Resource-Limited Settings. PLoS ONE 9 (7): e102224.

[2] Higgs ES, Goldberg AB, Labrique AB, Cook SH, Schmid C, Cole CF, Obregon R. Understanding the Role of mHealth and Other Media Interventions for Behavior Change to Enhance Child Survival and Development in Low- and Middle-Income Countries: An Evidence Review. Journal of Health Communication. 2014;19:164-189.

[3] Ibid.

Table 1: Evidence Hierarchy of Mobile Messaging for MNCH

Strength of Evidence	Type of Evidence	Strengths and Weaknesses	Intervention/Research	Results/Findings
	Systematic or Meta-Reviews of Controlled Studies (Most robust)	Many studies are combined and analyzed using systematic methods	Review of behavior change interventions delivered through SMS	Of 9 randomized and quasi-controlled studies, **8 found evidence to support text messaging as a tool for behavior change**. Effects exist across age, minority status, and nationality. Nine countries are represented, only one is a developing country, which is unfortunate given potential benefits of such a widely accessible, relatively inexpensive tool for health behavior change.[1]
			Cochrane Database System Review, RCTs of SMS for ART in Kenya	Two RCTs reviewed found high-quality evidence that **mobile phone text-messaging at weekly intervals is efficacious in enhancing adherence to ART**, compared to standard care, and there is high quality evidence from one trial that weekly mobile phone text-messaging is efficacious in improving HIV viral load suppression as well.[2]
			Healthcare via Cell Phones: A Systematic Review	Review of 25 controlled studies in 13 countries evaluating mobile interventions, **8 out of 10 of the behavior change studies reported change in behavior after receiving informational intervention through mobile voice or text messaging**. Common qualities among these are: personalized messaging and support, goal specific prompts, and reminders for appointments.[3]
	Randomized Controlled Studies	Effects gathered in method includes random allocation of subjects to groups	Chipatala Cha Pa Foni, Malawi (N = 6,479)	Evaluation study demonstrates **increased uptake of home-based and facility-based practices** among the CCPF intervention group, including: increase in use of a bed-net during pregnancy and for children (25 percentage points higher than control group); attending four antenatal care (ANC) visits, starting ANC during the first trimester; giving birth in a facility; receiving a postnatal check-up within two days of birth; breastfeeding within one hour of birth (15 percentage points higher than control group), and exclusive breast-feeding through six months of age; and use of oral rehydration salts (ORS) to treat diarrhea.[4]
			Cell Life, South Africa (N =2,533)	Research illustrates that **SMS service influenced increased uptake of HIV testing**: the study found that participants who received 10 motivational-style SMS were more likely to go get an HIV test than: those who received 10 information only style SMS, those who received 3 motivational-style SMS and those in the control group.[5]
			Wired Mothers, Zanzibar, Tanzania (N =2,550)	RCT demonstrates **mobile service significantly increased proportion of women receiving recommended antenatal care** with more women receiving preventive health services, and more women with antepartum complications identified and referred[6] in the intervention group (44% versus 31% in the control group). In addition, **the intervention significantly increased the proportion of women delivering with a skilled birth attendant** (60% vs. 47% in the controlled group).
			SMS and Telephone Reminders vs. Standard of Care, China (N=1,859)	RCT shows that **clinic attendance rates were significantly higher in SMS and telephone groups** than in the control group. The advantages of SMS are: more private than voice calling and SMS does not require mobile phones to be active or within range and the messages can be held for a number of days.[7]
	Non-Randomized Controlled Studies (Includes Pre and Post-intervention Studies)	Effects gathered in scientific comparison method but not randomized	Text4Baby, USA (N = 939 and N=23,005)	**Increasing Health Knowledge and Preparedness:** 82% of total respondents reported Text4baby messages informed them of medical warning signs they did not know.[8] (N=939) **Improving Access and Facilitating Interaction with Health Providers:** 64% of respondents reported they talked to their doctor or midwife about information they read on a Text4Baby message. (N=23,005)

This hierarchy illustrates several important studies revealing significantly improved care-seeking by mothers enrolled in mobile messaging programs. Most notable are the randomized controlled trials carried out to examine effects of mobile messaging programs in Malawi and Zanzibar. In Malawi, an external evaluation study of the *Chipatala Cha Pa Foni* project demonstrated increased uptake of proven home- and facility-based practices among the intervention group, using a sample size of more than 6,000 women.[4] In Zanzibar, a pilot study conducted on the Wired Mothers intervention by researchers from the University of Copenhagen found that the mobile service significantly increased the proportion of women receiving recommended antenatal care and delivering with a skilled birth attendant, with more women receiving preventive health services, and more women with antepartum complications identified and referred.[5]

This evidence, however limited, can be used to inform governments, donors, implementers and other industry partners as they invest in further mobile messaging interventions and additional rigorous research studies.[6] There are increasing signs of maturity as mHealth strategies are considered more seriously for low- and middle-income country contexts, e.g., donors are providing support for more robust studies to measure effectiveness and costs and academic institutions and other global health agencies are increasingly conducting reviews of the latest evidence.[7]

Early Evidence from MAMA

MAMA's early findings from formative research where small numbers of subscribers were sampled and the research objectives focused on satisfaction, acceptability and usability of the service, the technology and the messaging content. Enrollment data continues to be analyzed to understand the extent to which subscribers belong to the population groups targeted in each country. The early MAMA findings have been positive and encouraging regarding subscribers' satisfaction and trust in the service; however, the findings remain at the lower-level types of scientific rigor. While structured and systematic, survey methods used lacked significant sample sizes as well as scientific comparators (i.e., a baseline or a control group) at the outcome level.

The Evidence Hierarchy document (Annex 1) details primary data gathered and released thus far by MAMA Country Program research teams in Bangladesh and South Africa.

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[4] Watkins, Susan Cotts; Robinson, Amanda and Dalious, Michael. "Evaluation of the Information and Communications Technology for Maternal, Newborn and Child Health Project" Invest in Knowledge Initiative, December 2013.

[5] Lund et al, "Mobile phones improve antenatal care attendance in Zanzibar: a cluster randomized controlled trial" BMC Pregnancy and Childbirth 2014, 14:29 (17 January 2014)

Lund S, Hemed M, Nielsen B, Said A, Said K, Makungu M, Rasch V. "Mobile phones as a health communication tool to improve skilled attendance at delivery in Zanzibar: a cluster-randomised controlled trial." BJOG 2012;119:1256–1264.

[6] Philbrick, W.C., "mHealth and MNCH, State of the Evidence", mHealth Alliance and United Nations Foundation, January 2013, page 6.

[7] Agarwal S, Labrique A. Newborn Health on the Line; the Potential mHealth Applications. Journal of American Medical Association. 2014;312(3):229-230.

Table 2: Hierarchy of MAMA Evidence

Strength of Evidence ↑

Type of Evidence	Strengths and Weaknesses	Intervention/Research	Results
Focus Group Discussions, Phone and User Surveys	Effects gathered in a structured and systematic method but no scientific comparisons	MAMA Bangladesh Phone Surveys (N = 120)	**Higher levels of adoption** of key behaviors and practices when the **woman and another family member both receive the MAMA messages**, as indicated in these responses: 83% of respondents attended the recommended four **antenatal care** visits, 63% of respondents gave **birth in a health facility**, 100% of respondents who gave birth at home reported using a **safe delivery kit**, 77% of respondents received **post-natal care within 48 hours** of giving birth, 95% of respondents **exclusively breastfed** their babies up to 6 months, 95% of respondents completed their babies' **Pentavalent vaccinations** 90% rated the service as "Excellent" and the average satisfaction and usability rating was 4.9 out of 5.
		MAMA South Africa Mobi Polls (N ranges 341 – 2,530)	**Vulnerable mothers using the mobisite:** 77% are unemployed (N=1,701), 52% receive a social grant (N=341), 47% live in a household with a combined monthly income of $180 USD or less (N=2,530), 44% live in a village or rural area (N=374).
		MAMA South Africa Focus Group Discussions on SMS Service (42 participants)	**Most participants** received **information that was new** to them and made them **change their behaviour.** The MAMA SMS service calmed and prepared mothers for their baby's arrival; highlighted causes of concern that they would otherwise have ignored as petty or normal; and increased their appreciation for why they should continue taking HIV treatments when pregnant. The information exceeded that of other sources like pregnancy magazines and clinic consultations – "it was so simple and direct". The service **empowered subscribers** to oppose unhealthy cultural practices, ask questions at the clinic, and to talk about health related issues with their partners. Subscribers liked the privacy of the platform – especially that it wasn't face-to-face, awkward and uncomfortable. Almost all women passed on sign-up details to others they felt could benefit from the service.
Enrollment Data	Number and type of people reached, no data on effects of the intervention	MAMA Bangladesh IVR and SMS Service (N ranges 118,922 – 170,302)	**Vulnerable mothers subscribed to service:** 35% of subscribers have a primary school education or less (N = 118,922), and 77% of subscribers have a combined household income of $130 USD or less per month (N=170,302)
		MAMA South Africa SMS Service (N=10,163)	**Vulnerable mothers subscribed to SMS service:** 44% live in a household with a combined income of $126 USD or less per month **Interesting details about SMS subscribers:** 58% request the HIV+ specific content, 99% have their own phone and 34% can access the internet on their phones
Anecdotal User Stories (Lowest level of evidence)	Effects discussed informally - using unstructured and unsystematic method, no comparisons	Stories from MAMA subscribers that span the spectrum of results – **change in knowledge, confidence, assertiveness, behaviors, practices, health status, and phone ownership**: • Different and improved health practices and healthier mother and baby compared to previous pregnancies and births (without the MAMA service) • Able to distinguish between when to go to a clinic and when not to go (thus saving valuable time and money that would have been spent on unnecessary trips to the clinic) • Messages saved on phones to show to partner, improved household communication, support and involvement of partner and health-related decision-making • Mothers are more confident of what they need to do during pregnancy, for baby and for themselves; and are more comfortable asking others for help • Mothers challenging healthcare providers when they are turned away from clinics or did not receive a service or commodity that they learned they are entitled to • MAMA service makes mothers feel like someone cares about them • Change in cell phone ownership, mothers now have a valid reason to own their own cell phone to receive their MAMA text messages	

MAMA Outcome-Level Research

MAMA has entered a new phase of research where research partners are exploring the effectiveness of the MAMA programs in improving knowledge, behavior, and practices that are linked to improved health status. In India and South Africa, this research also includes questions around the cost utility of the MAMA program. The table below provides an overview of the studies currently underway in Bangladesh, South Africa and India.

Table 3: MAMA's Current Outcome-level Studies

	Research Questions	**Methodology**	**Timeframe**
Bangladesh	1) Does the messaging program have a positive impact on a mother's antenatal and postnatal care practices? 2) For those women who adhere to the recommendations, do they have a positive impact on their health, and the health of their child? 3) What aspects of the messaging are most effective in prompting women who are enrolled to take action?	Qualitative studies using semi-structured interviews, focus groups, and key informant interviews. Quantitative study using retrospective observational study with propensity score matching of treatment and standard of care groups.	2012 – 2015
South Africa	1) What is the effect of dosage/exposure of stage-based text messages on improving MNCH outcomes? 2) Does co-enrollment into a text message and mobi- platform service improve infant health (immunizations) and maternal outcomes (ANC attendance), compared to a historical cohort of pregnant women that received the standard of care? 3) What are the cost and outcome differences between the intervention and standard of care?	Due to the launch of *MomConnect* in South Africa, study of the SMS program is retrospective. The methodology includes: - Clinical records review of treatment and standard of care groups - Semi-structured interviews (post-intervention) - Analysis of intervention and standard of care costs	2014 - 2015

	Research Questions	Methodology	Timeframe
India	Does the intervention lead to: 1. An increase in uptake of routine and risk-related health services by women during pregnancy and until the baby is one year old? 2. Improvements in hemoglobin levels at the time of delivery? 3. A reduction in infant under-nutrition?	A prospective cohort study, using intervention and control design. The methodology includes: - Clinical records review of treatment and standard of care groups - Semi-structured interviews (pre-intervention and after baby turns one year old) - Analysis of intervention and standard of care costs	2015 - 2016

Contribution vs. Attribution

Social and behavioral change are seldom attributable to one factor; hence, MAMA Country Programs' research studies are geared for measuring *contribution* to outcome-level impact as opposed to *attribution*. The complex nature of the social environments make it difficult to attribute any change to the mobile messaging service alone. Causal explanations in MAMA evaluation studies would be overly ambitious or simplistic due to many influencing variables, especially considering that most MAMA country contexts have many actors undertaking a variety of efforts aimed at improving knowledge, behaviors and practices relating to maternal and child health. It is also rare that a demand generation initiative is not paired with the appropriate supply-side response. Thus, the aim of the MAMA studies is to ascertain the *correlation* between mobile messaging and key behaviors and outcomes of interest.

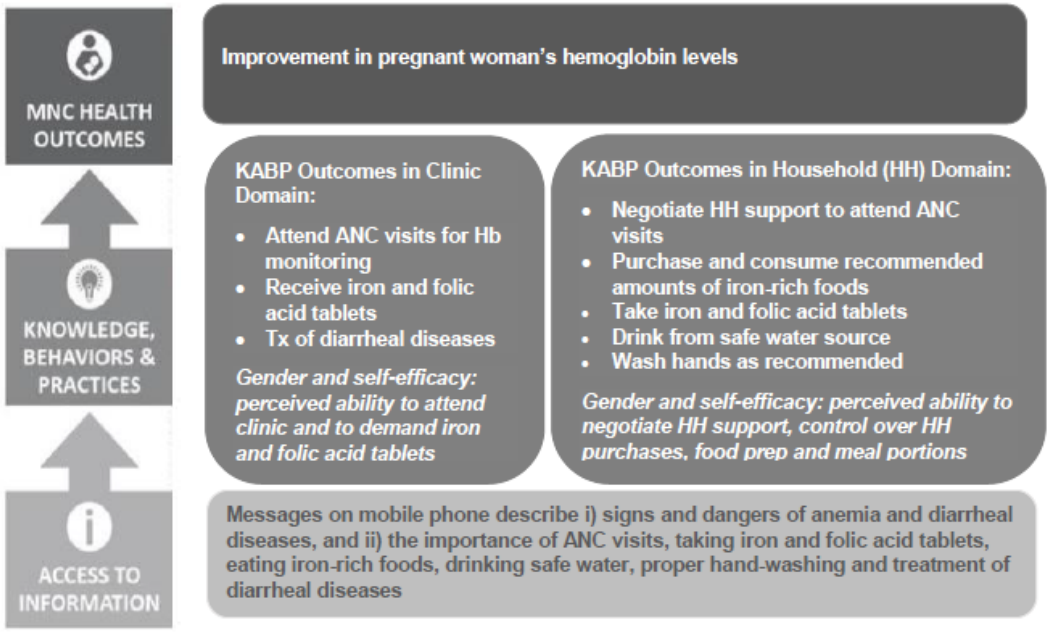
Domains and Data Sources

The main maternal actions of interest for MAMA programs occur in two main domains: in the household and in the health facility. Potential changes related to MNCH within the household domain include control and influence over household expenditures and health-related decisions, self-care, caregiving to infants, and support for uptake of clinical services. The best possible source of information about these household level actions and changing dynamics are the women and household members themselves. These data are gathered using a variety of quantitative and qualitative methodologies in all three current studies.

Clinical records and registers are often the most reliable source of information on health services attended and clinical outcomes. While clinic records can have fundamental data quality weaknesses, such as completeness, these sources can be incredibly informative in terms of when individuals accessed various preventive and curative services as well as data on the health status of the mother and baby. Before research teams embark on studies that rely upon clinical records as a source, a review of a sample of records is conducted to assess the viability of the records as a source.

In India, anemia is one of the main direct causes of delivery complications and maternal death. Early identification of severe anemia and regular monitoring of treatment is important for safe delivery for mother and child. Thus, the MAMA program in India gives a great deal of importance to the prevention and treatment of anemia. Figure 2 below illustrates how the different levels of change across the household and clinic domains could jointly contribute to improvement in a woman's hemoglobin levels.

Figure 2: Example of Potential Pathway of Change (Hemoglobin levels)



MAMA research partners in India and South Africa have identified key data points within clinical and patient records that will be used to validate self-reported claims of certain behaviors and practices, especially the uptake of MNCH-related clinical services.

Table 4 below reveals the prioritized health and behavioral outcomes and sources used to collect data on both MAMA subscribers and nonsubscribers. Clinical records are available in India and South Africa to explore the level of change beyond the self-reported, such as actual services attended and when, as well as results of biological marker tests.

Table 4: Prioritized Health and Behavior Outcomes

		Bangladesh	South Africa	India
MNCH Biomarkers of Health Outcomes	Hemoglobin Levels/Anemia in Mothers			Clinic Records
	Babies' Anthropometric Measurements			Clinic Records
	CD4 Count from Mothers with HIV		Clinic Records	
	WHO Stage of Mothers with HIV		Clinic Records	
	TB Status of Mothers with HIV		Clinic Records	
	Babies' HIV Test Results (Mothers with HIV)		Clinic Records	
MNCH Behaviors, Practices, and Service Uptake	Mothers Nutrition/Diet/Folic Acid/Iron Tablets	Self-Report	Self-Report	Self-Report
	Breastfeeding: exclusive and colostrum	Self-Report	Self-Report	Self-Report
	ANC	Self-Report	Self & Clinic	Self & Clinic
	Gestational Age at first ANC	Self-Report	Self & Clinic	Self & Clinic
	Facility-Based Births	Self-Report		Self & Clinic
	PNC	Self-Report	Self & Clinic	Self & Clinic
	HIV Counselling and Testing		Self & Clinic	Self & Clinic
	ARV		Self & Clinic	
	Immunizations	Self-Report	Self & Clinic	Self & Clinic
	Early Detection & Action for Risk Factors	Self-Report	Self & Clinic	Self & Clinic
	Empowerment/Gender/Self Efficacy	Self-Report	Self-Report	Self-Report

Cost Utility

In addition to the studies on health and behavior outcomes of MAMA users, research teams in South Africa and India will also undertake cost utility analyses of the MAMA programs in those countries. They will do so by assessing the cost of delivering the messaging service alongside the health outcomes experienced by those in the intervention groups as compared to the control groups. This component leverages the Lives Saved Tool and is intended to help inform health policy makers and program managers.

Conclusion

MAMA has prioritized assessing the effectiveness and impact of its country program interventions in Bangladesh, South Africa and India, as well as any future country program. Each country research team has designed a mixed-methods experimental study that maps to the overall MAMA research framework and applies similar quantitative methodologies to enable comparisons to be made between MAMA country programs. These studies include statistically significant samples with control groups, to improve the quality of scientific rigor being used to evaluate the interventions. The ultimate aim of this effort is to contribute to the evidence base for mHealth and MAMA's momentum toward scale, sustainability and integration as part of countries' standards of practice. The priorities for these studies include the use of clinical data on services and biological markers to validate self-reported claims of behavior change. When possible, cost utility studies of the interventions have also been incorporated. Findings of this research is planned to be disseminated directly through MAMA publications and through the submission of abstracts and papers to peer-reviewed journals.

ANNEX 1: Evidence Hierarchy of Mobile Messaging for Improved MNCH

Table 1: Most Scientifically Robust Evidence

Strength of Evidence ↑

Type of Evidence	Strengths and Weaknesses	Intervention/Research	Results/Findings
Systematic or Meta-Reviews of Controlled Studies (Most robust)	Many studies are combined and analyzed using systematic methods	Review of behavior change interventions delivered through SMS	Of 9 randomized and quasi-controlled studies, 8 found evidence to support text messaging as a tool for behavior change. Effects exist across age, minority status, and nationality. Nine countries are represented, only one is a developing country, which is unfortunate given potential benefits of such a widely accessible, relatively inexpensive tool for health behavior change.[1]
		Cochrane Database System Review, RCTs of SMS for ART in Kenya	Two RCTs reviewed found high-quality evidence that mobile phone text-messaging at weekly intervals is efficacious in enhancing adherence to ART, compared to standard care, and there is high quality evidence from one trial that weekly mobile phone text-messaging is efficacious in improving HIV viral load suppression as well.[2]
		Healthcare via Cell Phones: A Systematic Review	Review of 25 controlled studies in 13 countries evaluating mobile interventions, 8 out of 10 of the behavior change studies reported change in behavior after receiving informational intervention through mobile voice or text messaging. Common qualities among these are: personalized messaging and support, goal specific prompts, and reminders for appointments.[3]
Randomized Controlled Studies	Effects gathered in method includes random allocation of subjects to groups	Chipatala Cha Pa Foni, Malawi (N = 6,479)	Evaluation study demonstrates increased uptake of home-based and facility-based practices among the CCPF intervention group, including: increase in use of a bed-net during pregnancy and for children (25 percentage points higher than control group); attending four antenatal care (ANC) visits, starting ANC during the first trimester; giving birth in a facility; receiving a postnatal check-up within two days of birth; breastfeeding within one hour of birth (15 percentage points higher than control group), and exclusive breast-feeding through six months of age; and use of oral rehydration salts (ORS) to treat diarrhea.[4]
		Cell Life, South Africa (N =2,533)	Research illustrates that SMS service influenced increased uptake of HIV testing: the study found that participants who received 10 motivational-style SMS were more likely to go get an HIV test than: those who received 10 information only style SMS, those who received 3 motivational-style SMS and those in the control group.[5]
		Wired Mothers, Zanzibar (N =2,550)	RCT demonstrates mobile service significantly increased proportion of women receiving recommended antenatal care with more women receiving preventive health services, and more women with antepartum complications identified and referred[6] in the intervention group (44% versus 31% in the control group). In addition, the intervention significantly increased the proportion of women delivering with a skilled birth attendant (60% vs. 47% in the controlled group).
		SMS and Telephone Reminders vs. Standard of Care, China (N=1,859)	RCT shows that clinic attendance rates were significantly higher in SMS and telephone groups than in the control group. The advantages of SMS are: more private than voice calling and SMS does not require mobile phones to be active or within range and the messages can be held for a number of days.[7]
Non-Randomized Controlled Studies (Includes Pre and Post-intervention Studies)	Effects gathered in scientific comparison method but not randomized	Text4Baby, USA (N = 939 and N=23,005)	Increasing Health Knowledge and Preparedness: 82% of total respondents reported Text4baby messages informed them of medical warning signs they did not know.[8] (N=939) Improving Access and Facilitating Interaction with Health Providers: 64% of respondents reported they talked to their doctor or midwife about information they read on a Text4Baby message. (N=23,005)

[1] Cole-Lewis, Heather and Kershaw, T. "Text messaging as a tool for behavior change in disease prevention and management." Epidemiol Rev. 2010 Apr;32(1):56-69.
[2] Horvath T, Azman H, Kennedy GE, Rutherford GW: Mobile phone text messaging for promoting adherence to antiretroviral therapy in patients with HIV infection. Cochrane Database Syst Rev 2012, 3:CD009756.
[3] Krishna, Santosh; Boren, Suzanne Austin; and Balas, Andrew E. "Healthcare via Cell Phones: A Systematic Review" Telemedicine and e-Health. April 2009, 15(3): 231-240
[4] Watkins, Susan Cotts; Robinson, Amanda and Dalious, Michael. "Evaluation of the Information and Communications Technology for Maternal, Newborn and Child Health Project" Invest in Knowledge Initiative, December 2013
[5] Katherine de Tolly, Donald Skinner, Victoria Nembaware, and Peter Benjamin. "Investigation into the use of short message services to expand uptake of human immunodeficiency virus testing, and whether content and dosage have impact" Telemedicine and e-Health. January/February 2012, 18(1): 18-23. doi:10.1089/tmj.2011.0058.
[6] Lund et al, "Mobile phones improve antenatal care attendance in Zanzibar: a cluster randomized controlled trial" BMC Pregnancy and Childbirth 2014, 14:29 (17 January 2014)
Lund S, Hemed M, Nielsen B, Said A, Said K, Makungu M, Rasch V. "Mobile phones as a health communication tool to improve skilled attendance at delivery in Zanzibar: a cluster-randomised controlled trial." BJOG 2012;119:1256–1264.
[7] Zhou-wen, Chen; Li-zheng, Fang; Li-ying, Chen and Hong-lei, Dai. "Comparison of an SMS text messaging and phone reminder to improve attendance at a health promotion center: A randomized controlled trial" Journal of Zhejiang University SCIENCE B January 2008, Volume 9, Issue 1, pp 34-38
[8] Martinez, K. and Uekusa, S. 2013 National Survey of Text4baby Participants. California State University San Marcos (CSUSM). Available from: http://www.csusm.edu/anthropology/docsandfiles/Text4baby.pdf.

Table 2: Least Scientifically Robust Evidence – Data from MAMA Country Programs

Strength of Evidence ↑

Type of Evidence	Strengths and Weaknesses	Intervention/Research	Results
Focus Group Discussions, Phone and User Surveys	Effects gathered in a structured and systematic method but no scientific comparisons	MAMA Bangladesh Phone Surveys (N = 120)	**Higher levels of adoption** of key behaviors and practices when the **woman and another family member both receive the MAMA messages**, as indicated in these responses: 83% of respondents attended the recommended four **antenatal care** visits, 63% of respondents gave **birth in a health facility**, 100% of respondents who gave birth at home reported using a **safe delivery kit**, 77% of respondents received **post-natal care within 48 hours** of giving birth, 95% of respondents **exclusively breastfed** their babies up to 6 months, 95% of respondents completed their babies' **Pentavalent vaccinations** 90% rated the service as "Excellent" and the average satisfaction and usability rating was 4.9 out of 5.
		MAMA South Africa Mobi Polls (N ranges 341 – 2,530)	**Vulnerable mothers using the mobisite:** 77% are unemployed (N=1,701), 52% receive a social grant (N=341), 47% live in a household with a combined monthly income of $180 USD or less (N=2,530), 44% live in a village or rural area (N=374).
		MAMA South Africa Focus Group Discussions on SMS Service (42 participants)	**Most participants received information that was new** to them and made them **change their behaviour.** The MAMA SMS service calmed and prepared mothers for their baby's arrival; highlighted causes of concern that they would otherwise have ignored as petty or normal; and increased their appreciation for why they should continue taking HIV treatments when pregnant. The information exceeded that of other sources like pregnancy magazines and clinic consultations – "it was so simple and direct". The service **empowered subscribers** to oppose unhealthy cultural practices, ask questions at the clinic, and to talk about health related issues with their partners. Subscribers liked the privacy of the platform – especially that it wasn't face-to-face, awkward and uncomfortable. Almost all women passed on sign-up details to others they felt could benefit from the service.
Enrollment Data	Number and type of people reached, no data on effects of the intervention	MAMA Bangladesh IVR and SMS Service (N ranges 118,922 – 170,302)	**Vulnerable mothers subscribed to service:** 35% of subscribers have a primary school education or less (N = 118,922), and 77% of subscribers have a combined household income of $130 USD or less per month (N=170,302)
		MAMA South Africa SMS Service (N=10,163)	**Vulnerable mothers subscribed to SMS service:** 44% live in a household with a combined income of $126 USD or less per month **Interesting details about SMS subscribers:** 58% request the HIV+ specific content, 99% have their own phone and 34% can access the internet on their phones
Anecdotal User Stories (Lowest level of evidence)	Effects discussed informally - using unstructured and unsystematic method, no comparisons	Stories from MAMA subscribers that span the spectrum of results – **change in knowledge, confidence, assertiveness, behaviors, practices, health status, and phone ownership**: • Different and improved health practices and healthier mother and baby compared to previous pregnancies and births (without the MAMA service) • Able to distinguish between when to go to a clinic and when not to go (thus saving valuable time and money that would have been spent on unnecessary trips to the clinic) • Messages saved on phones to show to partner, improved household communication, support and involvement of partner and health-related decision-making • Mothers are more confident of what they need to do during pregnancy, for baby and for themselves; and are more comfortable asking others for help • Mothers challenging healthcare providers when they are turned away from clinics or did not receive a service or commodity that they learned they are entitled to • MAMA service makes mothers feel like someone cares about them • Change in cell phone ownership, mothers now have a valid reason to own their own cell phone to receive their MAMA text messages	

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