



LEVERAGING MOBILE TECHNOLOGIES FOR MATERNAL, NEWBORN & CHILD HEALTH: A FRAMEWORK FOR ENGAGEMENT

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TABLE OF CONTENTS

ACKNOWLEDGEMENTS	4
EXECUTIVE SUMMARY	6
LIST OF ACRONYMS	7
INTRODUCTION AND METHODOLOGY	9
THE “WHY” - RATIONALE FOR TARGETING MNCH AND USING MHEALTH	9
THE “WHERE” - GEOGRAPHIC FOCUS	11
THE “WHAT” - STRATEGIC OBJECTIVES	11
THE “HOW” - GUIDING PRINCIPLES AND OPERATIONAL PRIORITIES.....	15
THE “WHO” - STAKEHOLDERS	16
THE “WHEN” - CONCLUSION	16
APPENDICES	
Appendix “A” Using Mobile Technology in Other Sectors That Impact MNCH.....	18
Appendix “B” Health Systems Strengthening: Illustrative Outcomes/Milestones	19
Appendix “C” Integration: Illustrative Outcomes/Milestones	20
Appendix “D” Gender Mainstreaming and Women’s Empowerment: Illustrative Outcomes/Milestones	21
Appendix “E” Operational Priorities: Illustrative Activities.....	22
Appendix “F” Operational Priorities, Guiding Principles and Illustrative Stakeholders	23
ENDNOTES	24

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**THE RAPIDLY ADVANCING
INNOVATIONS IN MHEALTH
AND ICT WILL CONTRIBUTE
TO GLOBAL EFFORTS TO
IMPROVE MNCH....**



EXECUTIVE SUMMARY

The global community has identified improving maternal, newborn and child health (“MNCH”) as a strategic development priority, embedding the goal within Millennium Development Goals 4 (reducing child mortality) and 5 (improving mothers’ health). While there has been global progress toward achieving these goals by the target date of 2015, there are still significant gaps and disparities in achieving better women’s and children’s health in LMICs.¹

A powerful tool exists that has the potential to reduce these disparities and improve access to quality health services leading to significantly improved health for women and children in the poorest and hardest to reach areas of the globe. The rapid proliferation of mobile phone technology in LMICs has generated mobile phone based innovations for facilitating and delivering MNCH and other health services to hard to reach and vulnerable populations (“mHealth”). Recognizing the potential of mHealth, global initiatives such as “Every Woman Every Child” and the “Call-to-Action – Child Survival,” and related initiatives such as the *Commission on Information and Accountability* and the *Commission on Life-Saving Commodities for Women and Children* have explicitly identified mobile technology as a tool to directly and indirectly improve health outcomes in almost every corner of the world.

The current health landscape includes numerous pilot projects using mobile phones. While these pilots are generating evidence of the effectiveness of mHealth in reducing morbidity and mortality, the body of literature documenting the evidence is still nascent, and the global health, implementing and policy communities have not yet fully embraced mHealth as a strategic tool. In order to unleash the potential that mHealth has for improving health outcomes, particularly for women and children, strategic coordination is not only necessary, but must happen now.

This paper lays out a strategic framework to help global health specialists, implementers and policy makers working to achieve MDGs 4 and 5 conceptualize how mobile phone technology can be used to improve MNCH.

The strategic framework for using mHealth to improve MNCH (“Framework”) sets forth the “Why”, “Where” “What”, “How” and the “When” to best use mHealth to improve MNCH. First, it lays out the justification for focusing on MNCH and the reasons for using mHealth to improve MNCH (the “Why”). Second, the Framework identifies low and middle income countries (LMICs) as the geographic target, particularly the countries where the

most significant gaps in MNCH coverage exist (the “Where”). Efforts to achieve impact, however, must come from the entire global community. Third, the Framework proposes that there are three **strategic objectives** (the “What”) that lead to improving MNCH in LMICs. The Framework conceptualizes in broad terms how mHealth potentially contributes to each of these strategic objectives:

- **Health systems strengthening** by using mHealth to contribute to each of the WHO’s 6 Building Blocks;
- **Integration** of health services, cross-sectoral services, health technologies, health systems and data systems;
- **Mainstreaming gender and empowering women** by addressing gender and social dynamics that impact access to quality health services for women as beneficiaries, service providers and designers.

Fourth, the Framework lays out five **operational priorities** (the “How”) for promoting and increasing the **effective** use of mHealth to achieve the strategic objectives. Addressing the gaps and barriers to using mHealth which have been identified in previous studies is the foundation for these operational priorities:

- **Advocacy** to MNCH stakeholders who have not yet fully embraced mHealth;
- **Sustainable financing** to pay for mHealth interventions and build economic self-sufficiency;
- **Capacity building** to use mHealth, mainstream gender, implement health services, measure results, translate evidence into policy, etc.;
- **Knowledge dissemination and using data for decision-making** to share evidence and implementation best practices, and to synthesize evidence and best practices to influence stakeholders;
- **Evidence** generation using rigorous methodologies showing both health impact and implementation best practices.

Four **guiding principles** crosscut the strategic objectives and operational priorities:

- Target the **most vulnerable**;
- Apply a **human rights approach** which includes working toward equitable health systems;

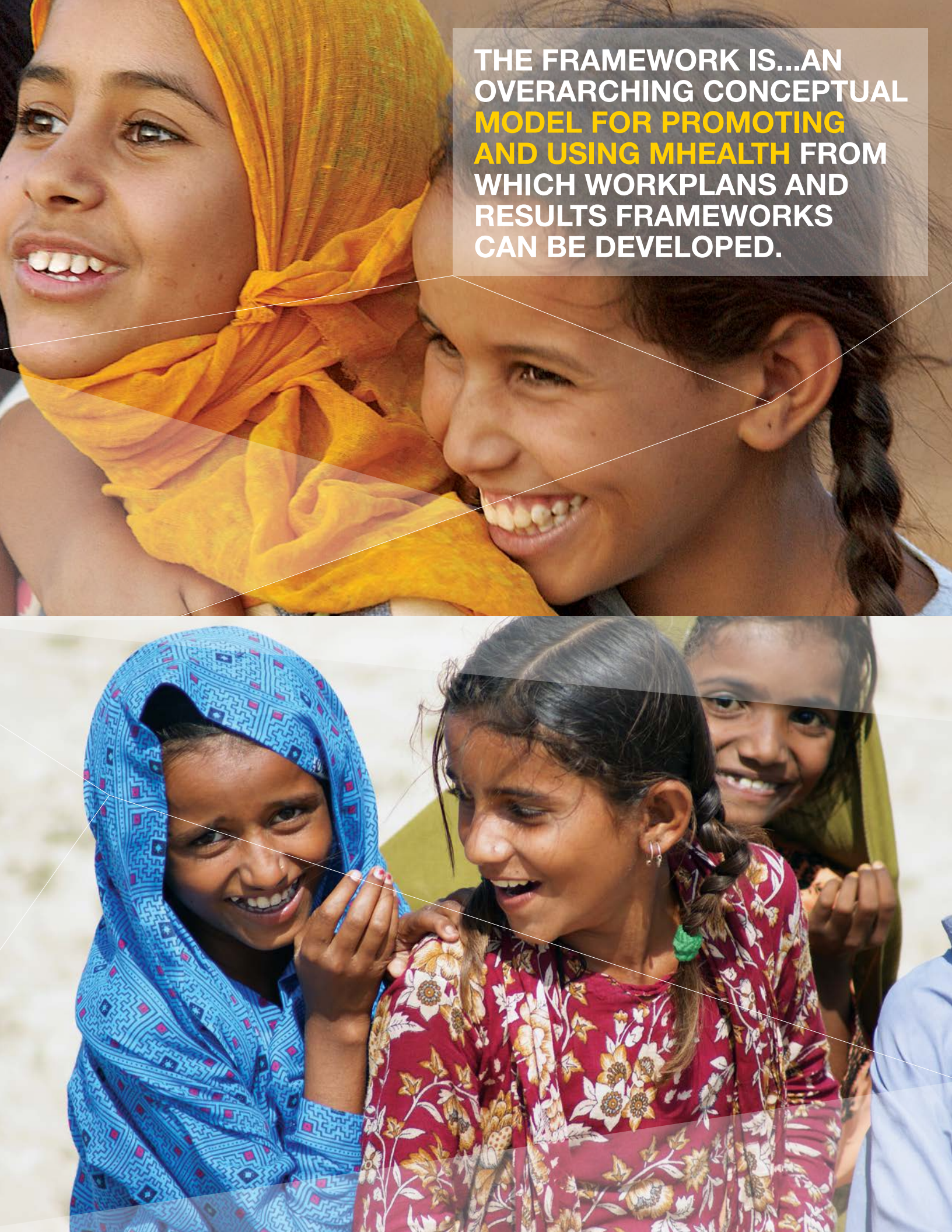
- Ensure **accountability and good governance** through monitoring and evaluation and;
- Working through **partnerships** that span sectors and include new and innovative groups.

Fifth, the Framework identifies those key stakeholder groups that have not yet fully embraced mHealth, but are important partners if mHealth is used to improve MNCH (the “Who”). These stakeholders include implementers (NGOs), global health specialists, funders, policymakers (governments), gender groups and community-based organizations (CBOs). Stakeholders who may have already embraced mHealth, particularly those in the technology fields such as mobile phone operators and mobile application developers, are a secondary target audience.

Lastly, the time for action is **now** (the “When”) with 2015 as the target date for achieving MDGs 4 and 5. However, there will certainly be a need well past 2015 to improve MNCH in LMICs. The rapidly advancing innovations in mHealth and ICT will contribute to global efforts to improve MNCH, particularly as implementation experience and studies demonstrating health impact are collected and broadly disseminated.

LIST OF ACRONYMS

CBO	Community-Based Organization
CD4	Cluster of Differentiation 4 (type of white blood cell that fights infection)
CHW	Community Health Worker
eHealth	Electronic technology including web-based and mobile for health
DHIS2	District Health Information Software 2
EGAT	Bureau for Economic Growth, Agriculture and Trade (USAID)
EMR	Electronic Medical Records
FBO	Faith-Based Organization
GSMA	GSM Association
ICT	Information and Communications Technology
IMCI	Integrated Management of Childhood Illnesses
K4Health	Knowledge for Health
LMICs	Low and Middle Income Countries
MAMA	Mobile Alliance for Maternal Action
MCHIP	Maternal & Child Health Integrated Health Program
MDG	Millennium Development Goal
MgSO4	Magnesium Sulfate (for eclampsia)
mHealth	Mobile technology, particularly mobile phones, for health
MHTF	Maternal Health Task Force
MNCH	Maternal, Newborn and Child Health
MoH	Ministry of Health
NGO	Non-Government Organization
NTD	Neglected Tropical Disease
ODK	Open Data Kit
OpenMRS	Open Medical Record System
PLWA	People Living with Aids
PMNCH	Partnership for Maternal, Newborn and Child Health
PMTCT	Prevention of Mother-to-Child Transmission
RFP	Request for Proposals
RMNCH	Reproductive, Maternal, Newborn and Child Health
SMS	Short Messaging Service (Texting)
SWOT	Strengths, Weaknesses, Opportunities, Threats
USAID	United States Agency for International Development
WASH	Water, Sanitation and Hygiene
WHO	World Health Organization



THE FRAMEWORK IS...AN
OVERARCHING CONCEPTUAL
**MODEL FOR PROMOTING
AND USING MHEALTH** FROM
WHICH WORKPLANS AND
RESULTS FRAMEWORKS
CAN BE DEVELOPED.

INTRODUCTION AND METHODOLOGY

The Framework sets forth a strategy for utilizing mobile technology, primarily mobile phones, to improve MNCH. Insofar as mHealth is a strategy in and of itself for improving MNCH, the Framework unpacks the components for using mHealth, providing the rationale and conceptual components for using mHealth to improve MNCH.

The Framework is not a workplan or a results framework but rather an overarching conceptual model for promoting and using mHealth from which workplans and results frameworks can be developed.

While referring to them, the Framework does **not** include **technological** strategic and operational priorities relating to mHealth.²

The Framework contributes to two major global initiatives, “Every Woman Every Child” and the “Call to Action – Child Survival”. Accordingly, the Framework reflects and complements the *United Nations Secretary General’s Global Strategy for Women’s and Children’s Health* and the strategies of the *Partnership for Maternal, Newborn and Child Health (PMNCH)*, the *Maternal Health Task Force (MHTF)*, the *Commission on Life-Saving Commodities for Women and Children*, and the *UN Commission for Information and Accountability*.

The **methodology** for developing the Framework was collaborative and included: 1) interviews with key stakeholders in the MNCH and mHealth communities; 2) a SWOT analysis; 3) a gaps and trends analysis of health initiatives, programs and evidence addressing MNCH and/or the use of mHealth; 4) a review of the strategies and workplans of initiatives and organizations whose missions are to improve MNCH (or a component thereof); and 5) a literature review of articles addressing the use of mobile technology to improve MNCH and other health and development areas which are relevant to MNCH.

THE “WHY” - RATIONALE FOR TARGETING MNCH AND USING MHEALTH

WHY MNCH AND HOW DO WE DEFINE IT?

Improving the health of mothers, newborns and children, particularly in LMICs, is an important global health priority. Their wellbeing is directly linked to the wellbeing of future generations and can predict future public health

challenges for health care systems. In the poorest nations of the world, MNCH is tied to achieving the Millennium Development Goals, the global blueprint for lifting nations out of extreme poverty. MNCH is specifically reflected in the targets for MDGs 4 and 5 (reducing child mortality and improving mothers’ health). MNCH also impacts and is impacted by MDGs 1, (eliminating poverty), 2 (universal education), 3 (gender equity), 6 (combatting HIV, malaria and other diseases), 7 (safe water and sanitation) and 8 (using new technologies, access to essential medicines and working with the private sector).

(See Appendix “A”)

MNCH should be viewed as a **continuum of reproductive, maternal, newborn and child health services** for women and children (the “RMNCH Continuum”). This means that health services should not be viewed as, or delivered mutually exclusive of each other, but rather holistically. When delivered as an integrated package of interventions targeting **both** mother and child over a period spanning pre-pregnancy, birth and the life of the child, health services are most effective in achieving better MNCH.³

The RMNCH Continuum includes services affording access to:

- Quality antenatal care
- Skilled birth attendants
- Prevention of mother-to-child transmission of HIV (PMTCT) prophylaxis
- Breastfeeding and infant and young child feeding (IYCF) counseling
- Immunizations
- Mosquito nets

These services, based upon evidence clearly demonstrating long-term health impact should also include:

- Sexual and reproductive health services (e.g., modern means of contraception)
- Family planning
- Early childhood development interventions (cognitive, socio-emotional and motor)⁴

Progress is being made in the area of improving MNCH in LMICs, but there are still major gaps and areas that are lagging in achieving global health goals. These areas include (but are not limited to): reducing maternal mortality attributable to hemorrhage, access to ARVs for HIV, PMTCT, post-natal follow-up, pediatric malarial treatment, preventing pediatric diarrheal diseases, and increasing access to modern contraceptives.⁵

WHY MHEALTH?

A component of a much larger ecosystem known as “eHealth” that includes systems such as electronic medical records (EMRs), laboratory and pharmacy systems, health information systems, and related infrastructure, mHealth is expanding exponentially each year. LMICs have fueled global mobile cellular subscriptions to reach almost 6 billion (in a global population of over 7 billion people) at the end of 2011. Cellular subscriptions in LMICs accounted for more than 80% of the 660 million new mobile-cellular subscriptions added in 2011 alone.⁶

Bolstered by the proliferation of phone subscriptions, LMICs are exploring and using mobile phones to facilitate the delivery of health services to populations that are hard-to-reach by reasons of geographical, social, gender and/or economic status.

Various uses of mHealth include:

By community health workers (CHWs) and health facility workers:

- Point of care diagnostics and referrals
- Decision support
- Patient tracking and follow-up

By Patients:

- Treatment adherence
- Emergency medical assistance
- Health education and sensitization (behavior change)

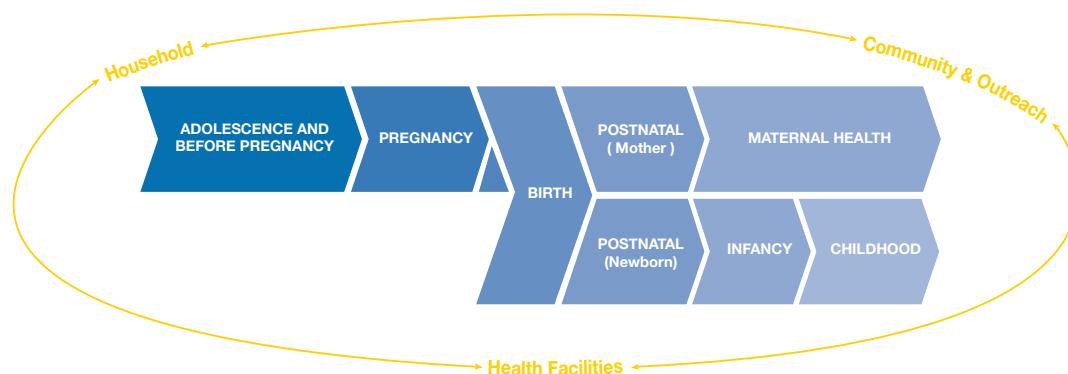
By health authorities and ministries of health:

- Data collection and management
- Disease surveillance

An increasing body of evidence shows that mHealth is being used effectively in areas related to MNCH to:

- Increase access to antenatal services
- Increase access to breastfeeding and infant and young child feeding counseling
- Reduce the three delays associated with maternal mortality⁷
- Improve anti-retroviral adherence for HIV+ patients
- Improve follow-up visits for both mothers and their children in the prevention of mother-to-child transmission
- Educate communities with key messaging relating to prenatal, postnatal and early childhood care
- Deliver pediatric malarial treatment regimens
- Deliver HIV test results connected with early infant diagnosis (of HIV)
- Deliver safe water and sanitation (WASH) interventions⁸
- Provide family planning messaging and information about modern means of contraception
- Collect and manage health data for health authorities.
- Implement integrated management of childhood illnesses (IMCI) protocols
- Remit vouchers for the payment of health services

RMNCH Continuum
Source: PMNCH



THE “WHERE” – GEOGRAPHIC FOCUS

GEOGRAPHICAL FOCUS

The Framework focuses on the countries in which gaps in MNCH and achieving MDGs 4 & 5 have been identified (Countdown to 2015), prioritizing those countries with 1) the largest gaps in MNCH service coverage, 2) potential political will to support mHealth, and 3) access to the necessary technical and connectivity capacity and infrastructure to mainstream mobile technology into global health.⁹ Working toward the Operational Priorities described below requires a **global effort**.

THE “WHAT” – STRATEGIC OBJECTIVES

HEALTH SYSTEMS STRENGTHENING

The first strategic objective that leads to improving both MNCH and the health of the general population in LMICs is the *strengthening of health systems*.¹⁰ The World Health Organization (WHO) has identified six (6) “Building Blocks” for health systems strengthening, and is developing an mHealth and ICT Framework for RMNCH that describes how mHealth strengthens health systems across the RMNCH Continuum.¹¹ Mobile technology can be harnessed to contribute to each of these 6 Building Blocks:¹²

- 1 Service delivery** Using mobile to increase and improve coverage, quality, access, adherence, timeliness and respectful provision of care and health services. This includes facilitating the supply and demand of essential services.
- 2 Health workforce** Using mobile for task shifting including building capacity and accountability, as well as monitoring the performance of frontline health workers.
- 3 Information systems** Using mobile to improve data collection, management and usage (“Data for

Decision-making”¹³). This includes tracking progress toward achieving the MDGs (**Countdown to 2015**) and contributing to the recommendations of the **UN Commission for Information and Accountability**. It also includes having ICT policies around data privacy and hosting (see “Leadership and good governance” below).

4 Medical products, vaccines and technologies

Using mobile for supply chain logistics and ensuring women and children have access to life-saving medicines and commodities in accordance with the recommendations of the **Commission on Life-Saving Commodities for Women and Children**.¹⁴ This also includes mobile-phone-based technologies for diagnostics (e.g., CD4 counts, MgSO₄ dosages)

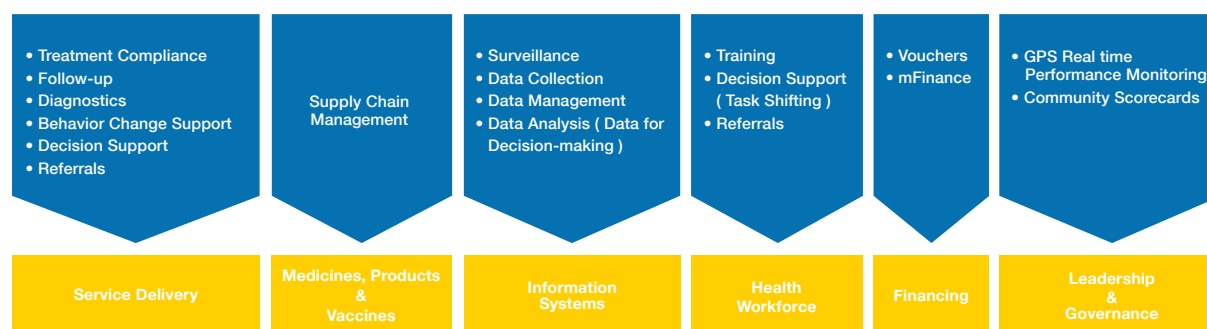
5 Financing

Using mobile as innovative delivery channels for financing MNCH services. These financing channels include vouchers, conditional cash transfers, mFinance, social enterprises and performance based financing.

6 Leadership and good governance

Using mobile to ensure accountability of frontline workers and health providers to women and children clients, as well as to the health system (e.g., GPS to monitor time spent with each patient). Using mobile to track, monitor and attribute the work of all stakeholders pursuant to the recommendations of the **UN Commission for Information and Accountability**.¹⁵ Most countries lack sufficient eHealth policy, which is required for strategic coordination. This includes having proper governance structures, sufficient resource allocation for coordination and support, and ICT policies around data privacy and hosting. The issue of privacy and security has been identified as a significant barrier to scaling mHealth initiatives and securing more private sector investment.¹⁶

ILLUSTRATIVE USES OF MOBILE TECHNOLOGY



WHO Health Systems Strengthening Building Blocks

See [Appendix “B”](#) for Health Systems Strengthening: Illustrative Milestones/Outcomes

INTEGRATION OF SERVICES AND SYSTEMS

The second strategic objective for improving MNCH, the integration of health services and systems, leads not only to improved health impacts, but also greater cost efficiencies.¹⁷ Improved cost efficiencies allow for the better allocation of increasingly scarce financial and human resources for global health. Conceptually, integration and how mobile technology facilitates integration can be broken down into four components.

1 Integrating Health Services: Linking services in a number of health areas such as antenatal care, nutrition, HIV prevention, care and treatment, malaria control and psycho-social support leads to more cost-efficient delivery of services, greater health impact and contributes to the health-related MDGs 4, 5 & 6 (reducing child mortality, improving mothers' health and eliminating HIV, malaria and other diseases).

Tools and guidelines have been developed to facilitate integration of services such as IMCI, the Essential Package for HIV and Early Childhood and Development and the Guidelines for the Integration of PMTCT, MNCH and Nutrition. Use of mobile technology for standard protocols offer a promising tool to not only deliver integrated interventions but to extend the services of the facility into the community and at the household level, where many conditions related to maternal and child mortality can be prevented.¹⁸

2 Integrating Cross-sectorally: Integration also includes linking health services with economic development, agriculture (food security), education, early childhood development (cognitive, socio-emotional, motor) and WASH, all of which directly

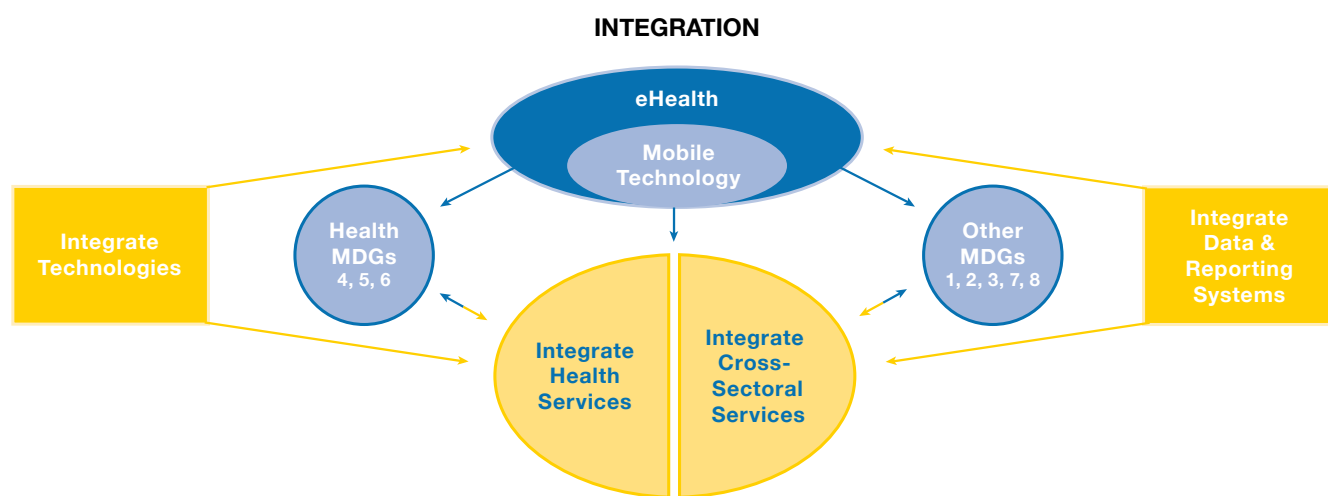
and indirectly impact the quality of health services and health outcomes. Addressing and integrating services to achieve the non-health MDGs (e.g., poverty, hunger, universal education, safe water and access to medicines) contribute to addressing underlying causes for gaps in MNCH coverage. Mobile technology is used in each of these non-health areas.

(See Appendix "A").

3 Integrating Health Technologies: For each of the numerous pilots and programs using mobile technology to address MNCH, HIV and Neglected Tropical Diseases (NTDs), there is almost an equal number of mobile technologies and software applications being used (e.g., ODK, CommCare, Frontline SMS). The lack of interoperability of many of these technologies with each other and with the broader eHealth system has been identified as a barrier to mHealth.¹⁹ Integrating these various technologies and applications by achieving interoperability serves to increase efficiencies and facilitate using mHealth.²⁰

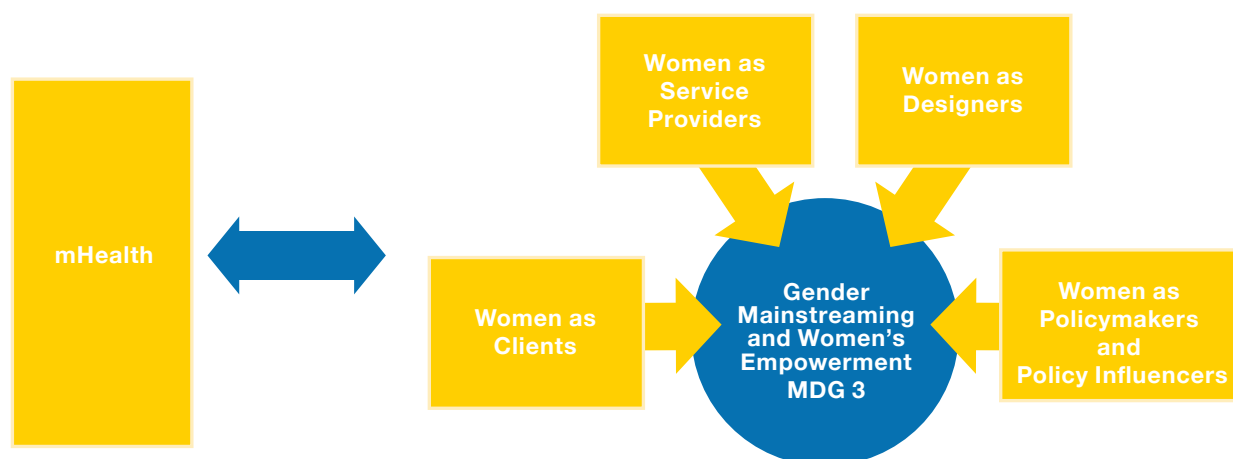
4 Integrating Data Systems and Reporting:

Related to integrating technologies, various systems that collect and manage health data for reporting and analysis require integration to a) better monitor the interrelationships between and among health conditions; b) monitor and track the delivery and services; c) effectively allocate resources, medicines and commodities where there is a need; and d) develop common indicators for measurement and comparisons. Examples of tools for integrating data and donor reporting systems include OpenMRS, DHIS2 and the WHO Indicator Repository.



See Appendix "C" for Integration: Illustrative Milestones/Outcomes

GENDER MAINSTREAMING AND WOMEN'S EMPOWERMENT



See [Appendix "D"](#) for Gender Mainstreaming and Women's Empowerment: Illustrative Milestones/Outcomes

MAINSTREAMING GENDER AND EMPOWERING WOMEN

The third, but often overlooked strategic objective leading to improved MNCH involves addressing **gender power dynamics**. Major gaps and barriers for women accessing quality health care are attributable to privacy concerns, fear of gender-based violence and women not having the same access to information and services as their male partners. Gender power dynamics affect women's ability to obtain essential health information, access quality health services and make informed decisions regarding their own health.²¹ Gender also plays a role in phone ownership and access to using phones. Phone ownership rates in LMICs are often much lower for women.²² Addressing these gender dynamics by empowering women, mainstreaming gender and working toward **gender equity** (MDG 3) in key areas connected with health plays a role in achieving better MNCH outcomes.

Accordingly, harnessing the potential of mobile technology to improve MNCH requires addressing gender power dynamics as they relate to using and owning mobile phones. The ability of women to own and use mobile phones without fear or retribution bears upon their ability to benefit from mHealth.²³ It is vital to understand and address these gender dynamics as they play a role and impact women as: 1) patients, 2) health service providers, 3) technology designers, and 4) policymakers and policy influencers.

The relationship between women's empowerment and gender mainstreaming with the use of mobile technology is a two-way relationship. Mobile phones can empower women by providing them with essential information to make well-informed health decisions. Mobile phones can also directly or indirectly (through CHWs) be used to afford women access to a variety of quality services which, in turn, leads to improved MNCH. Women who are empowered with information and access to quality services are better equipped to negotiate through difficult power dynamics, leading to, increased demand for, and access to mobile phones.²⁴

There are a number of tools and job aids available that build the capacity to address and mainstream gender considerations into health and other economic development interventions.²⁵ The way forward in developing a workplan for this Framework could include 1) leveraging the mWomen Report, conducting a situational analysis of how gender dynamics play a role in women taking advantage of mHealth tools for improving their own health and the health of their children; 2) mapping available gender tools and frameworks; 3) analyzing and contextualizing those gender tools and frameworks to mHealth; and 4) developing a framework and tools for mainstreaming gender and empowering women in the mHealth context.



**HARNESSING THE
POTENTIAL OF MOBILE
TECHNOLOGY TO
IMPROVE MNCH
REQUIRES ADDRESSING
GENDER DYNAMICS....**

THE “HOW” – GUIDING PRINCIPLES AND OPERATIONAL PRIORITIES

ASSUMPTIONS

The Framework has been developed under the assumption that **usability, feasibility and acceptability** of mHealth have been evaluated and addressed. The use of mHealth is very context-specific, depending upon the practical logistics of any given situation. Issues of connectivity, workability of the software, technological requirements, acceptability of the technology and messaging (if relevant) both by patients and service providers using mobile devices all must be addressed and ascertained.

GUIDING PRINCIPLES

1 Focusing on the most vulnerable Efforts to improve MNCH using mHealth should include the poorest, PLWA, orphans, indigenous populations, commercial and transactional sex workers and those living furthest from health services, taking into account the prevalence of illiteracy in many rural areas.

2 Rights based approach Every person has a right to quality health care. This includes addressing stigma, discrimination, social and economic marginalization.

3 Partnerships Collaborating with other organizations in various sectors (health, private- health and technology, government, research, NGOs, gender groups, CBOs, FBOs) is necessary to achieve the Strategic Objectives. Working with private technology companies and operators around using new technologies, and the pharmaceutical industry to afford access to essential medicines is a feature of **MDG 8**. Working in partnerships also includes innovative and new partnerships with organizations that have not yet been major stakeholders in using mHealth. These include NGOs, gender groups and community-based organizations.

4 Accountability and good governance Tracking, monitoring and evaluating progress generate accountability for achieving the Strategic Objectives. This includes ensuring there is: a) effective and efficient monitoring and evaluation systems; and b) ongoing research using rigorous research methodologies for evaluating processes, outputs, outcomes and impact. Vital to ensuring accountability and good governance is including members of the community, CBOs and FBOs in evaluation processes and feeding findings back to them.

OPERATIONAL PRIORITIES

The operational priorities address the barriers and obstacles to using mHealth. Several recent studies have identified these barriers and obstacles²⁶:

- Lack of rigorous evidence
- Limited technological integration
- Limited sources of sustained financing
- Policy challenges (limited precedence for providing an enabling policy environment for m/ehealth)
- Lack of capacity (to design and implement mHealth interventions)

Based upon studies, gaps analyses, identification of trends, the following operational priorities were identified to address the barriers and obstacles:²⁷

1 Generating evidence Promoting and generating quality **evidence** with rigorous research methodology that links mHealth to improved operational and **MNCH** outcomes. This would include focused research such as randomized control trials (when appropriate) that include methodologies for attribution, cost-effectiveness studies and cost-efficiency studies. Just as important, and a major gap in using mHealth for MNCH, is **capturing program implementation** best practices using tools such as **implementation science** and **value chain analysis**. Understanding practical lessons from implementing mHealth interventions, particularly around scaling up, requires **working with implementers** and generating evidence pertaining to **social and gender dynamics**.

2 Knowledge Sharing, Dissemination & Synthesis (Data for Decision-making): Identifying, collecting, curating and disseminating evidence and real-time data (on health impact, cost-effectiveness and cost-efficiency) – focusing on reaching the **global health, NGO, policy and funder communities**. Tools include listservs, databases, communities of practice, convening and presenting at forums. This operational priority does not stop at dissemination, but must include using the evidence to **feed into policy analysis and how decisions are made for programs**.

3 Sustainable Financing Identifying and promoting business models and **sustainable sources of financing** for using mHealth in MNCH programs. Such sources may include vouchers, conditional cash transfers, results based financing, voluntary savings

and loan groups, microfinance (including mBanking and mPayments), public-private partnerships and social enterprises.

4 Advocacy Advocating for global, national and organizational policies that support the use of mobile to improve MNCH. This includes a focus on heightening the awareness of the **global health, implementing, policymaking and funding communities**. Advocacy must be based upon evidence-based policy analysis. Key collaborating stakeholders might include the White Ribbon Alliance and the CORE Group.

5 Capacity Building Building the **capacity** of the health community with a particular focus on **global health specialists and evaluators, implementers, donors, frontline health workers and other stakeholders to design, integrate and evaluate** mHealth interventions to improve MNCH. Capacity building includes building an understanding of a) the underlying causes and influences on MNCH such as gender and poverty; b) best practices for implementation (through implementation science); and c) the role that mHealth potentially plays in impacting both underlying causes and implementation practices. Tools might include: developing conceptual frameworks (e.g., PMTCT-mHealth framework), workshops and web-based instructions.

See **Appendix “E”** for Operational Priorities: Illustrative Activities

THE “WHO” – STAKEHOLDERS

- 1 The most important stakeholders are, and always will be, the mothers, newborns and children being targeted for improved MNCH. They play a role in holding the health providers and health systems accountable.
- 2 The Framework focuses on promoting mHealth with the **global health, NGO, policy analysts, ministries of health (MoH), policymakers, CBOs, FBOs and funding communities** working in MNCH, with the goal of sensitizing and building the capacity of those communities to the potential of mHealth. Particularly important is focusing on the groups that **implement health interventions in LMICs**. Stakeholders who may have already embraced mHealth, particularly those in the technology fields such as mobile phone operators and mobile application developers, are a secondary target audience.

3 The Framework includes forming new innovative partnerships with groups such as gender organizations and community-based organizations (CBOs).

4 The Framework promotes **linking and complementing the activities of other organizations and initiatives that promote the use of mobile technologies and eHealth**.

5 The Framework **complements and feeds into the strategies and workplans of other organizations and initiatives which support the UN Global Strategy**.

Stakeholders: mHealth for improving MNCH



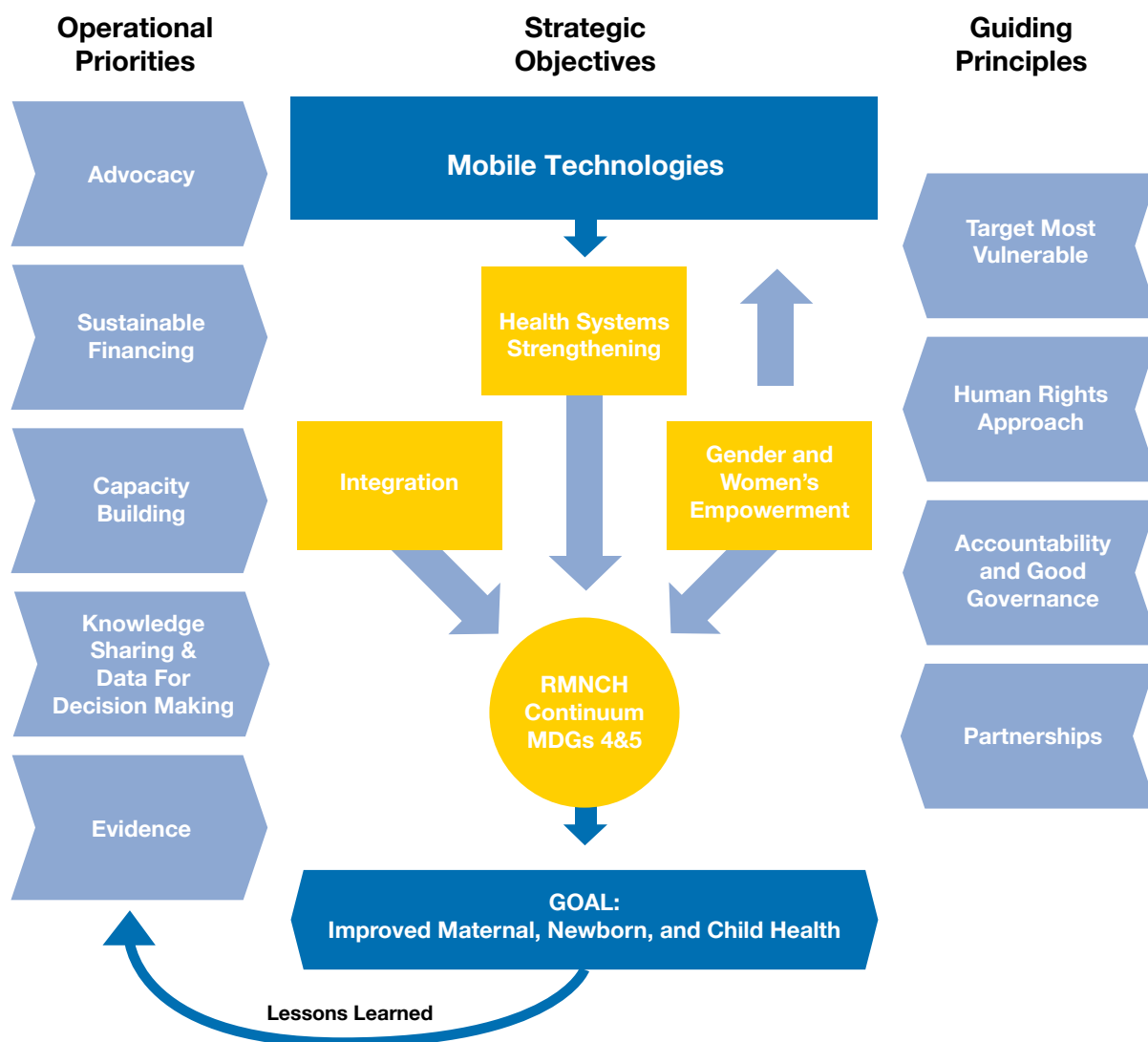
Appendix “F” for Operational Priorities, Guiding Principles and Illustrative Stakeholders

THE “WHEN” – CONCLUSION

The global community has set the year 2015 as the goal for achieving the MDGs, including MDGs 4 and 5. However, improving MNCH in LMICs (and globally) will be an ongoing effort that expands well past 2015.

The Framework attempts to apply a holistic lens to concepts that are often viewed in siloes. Working holistically, applying policy analysis to evidence of both health impact and implementation best practices, addressing gender dynamics, and collaborating through innovative partnerships that includes implementing, gender and community-based groups, are key components of a blueprint for effectively using mHealth to improve MNCH.

STRATEGIC FRAMEWORK: mHEALTH FOR IMPROVING MATERNAL, NEWBORN, AND CHILD HEALTH



APPENDIX “A” – Using Mobile Technology in Other Sectors that Impact MNCH

Intervention	Relationship to MNCH	MDG	How Mobile Technology is Used
Economic Strengthening	Generates income to pay for health services. Healthy women better able to work and earn income.	1 Reduce poverty and hunger	Mobile phones used to transmit market data
Education	Literacy for access to written health information. Healthy children can go to schools.	2 Universal Education	Mobile learning initiatives in rural African primary schools (UNESCO)
HIV	HIV is leading cause of mortality in southern Africa. Antenatal services include HIV testing.	6 Combat HIV, malaria and other diseases	SMS for treatment adherence and PMTCT follow-up
Safe Water	Water-borne diarrheal diseases leading killer of children in developing world. Awareness of mothers around health and water impose accountability on those who monitor water supplies.	7 Environmental Sustainability - Access to safe water	mWASH mobile applications provide underserved communities info on water supply/quality.
Gender	Gender power dynamics at the household and community levels impede mothers' ability to make informed health decisions and access to quality health care services.	3 Gender Equity	Using mobile phones to build community connections and mechanisms for support groups and making referrals.
Malaria	Malaria is a leading cause of child mortality in developing world. Healthy children better able to survive malaria.	6 Combat HIV, malaria and other diseases	Using mobile phones to implement pediatric malaria treatment protocols.
Access to medicines	Essential medicines to prevent hemorrhaging during delivery; ARVs to keep HIV+ mothers alive and healthy.	8 Global Partnerships - Working with pharma to afford access to drugs	Merck using mobile phones for supply chain logistics to track medicine supplies

APPENDIX “B” – Health Systems Strengthening: Illustrative Outcomes/Milestones

Strategic Objective	Illustrative Outcomes/Milestones
Health Systems Strengthening	
Service Delivery	<ul style="list-style-type: none"> - Mobiles are used to improve health service quality, improve timeliness, improve coverage, increase access to quality MNCH health services - Models and frameworks are developed and evidence of health impact, implementation best practices, scale-up and improved efficiencies is collected and disseminated - Capacity building tools are developed to use mobile in service delivery and for scaling up - Ministries of Health, WHO, funders and policy makers recognize mobile as a standard of practice to deliver health services in legislation, policy recommendations, practice guidelines, and RFPs
Health Workforce	<ul style="list-style-type: none"> - Mobiles are used to train health workers, particularly in rural areas - Mobiles are used to operationalize task shifting in areas where human resources are scarce - Mobiles are used to deliver health protocols to enable health workers to diagnose and make referrals - Mobiles are used to monitor, supervise and improve performance of health workers - Evidence of impact, implementation best practices are collected and disseminated - Workforce capacity building tools using mobiles to build health workforce capacity, making referrals and task shifting are developed and used in the field - Ministries of Health, WHO, funders and policy makers recognize mobiles as a standard of practice to build workforce capacity
Information Systems	<ul style="list-style-type: none"> - Mobiles are used by CHWs and health authorities to collect, manage and evaluate patient and health data - Mobiles are used for surveillance of health conditions (e.g., disease outbreaks, pregnancies in the community, verbal autopsies) - Ministries of Health incorporate mobiles as an information gathering tool for national health surveys
Medicines, Products, Vaccines	<ul style="list-style-type: none"> - Mobiles are used in supply chain logistics to track and monitor medical commodities and drugs - Mobile applications are used to track vaccinations of children - Mobile applications are used as a tool by health workers to determine correct dosages of drugs (e.g., MgSO₄)
Financing	<ul style="list-style-type: none"> - Mobiles are used for Vouchers, mPayments and conditional cash transfers to pay for health services - Models for social enterprises and franchises that use mobile and are linked to payment of health services are developed, evaluated, documented and disseminated - Sustainable business models such as results based financing for mobiles using tools such as value chain analysis are identified, tested, documented and adopted by the private sector
Leadership & Governance	<ul style="list-style-type: none"> - Mobiles are used to track community health worker performance and monitor health service centers - Mobiles are used by community members to hold health workers and health systems accountable

APPENDIX “C” – Integration: Illustrative Outcomes/Milestones

Strategic Objective	Illustrative Outcomes/Milestones
Integration	
Health Services	<ul style="list-style-type: none"> - Mobile based protocols, job aids and SMS messages developed and used to integrate maternal and newborn health (e.g., IMCI) messaging and services to same client - Protocols, job aids, SMS messages linking maternal and child health with HIV testing, counseling, care and support - Mobile used for tracking delivery of different health services to same client - Evidence of health impact, cost effectiveness, cost efficiencies and implementation best practices, collected, documented, analyzed and disseminated - Ministries of Health, WHO, funders, and policy makers recognize mobile as a standard of practice for integration of health services
Cross-Sectoral Services	<ul style="list-style-type: none"> - Mobile is used to integrate knowledge about safe water and sanitation services with health messaging and health services - Mobile used to link primary education with knowledge about healthy behaviors and access to health services - Mobile used to link economic enterprises such as village savings and loan groups with health messaging and health services - Models for integration are identified, evaluated and promoted - Evidence of health impact, cost effectiveness, cost efficiencies and implementation best practices, collected, documents, analyzed and disseminated - Ministries of Health collaborate with other ministries around models for integrating cross-sectorally using mobile and ICT
Health Technologies	<ul style="list-style-type: none"> - Health technologies used for NTD surveillance are integrated and interoperable with other health technologies used for HIV, MNCH and other health conditions: ODK, CommCare, RapidSMS, Mobenzi - Standard for interoperability of technologies are developed and promoted
Data Systems	<ul style="list-style-type: none"> - Multiple mHealth data bases are linked in same country bringing coverage of different health conditions into one consolidated data base (e.g., OpenMRS) - Standards of interoperability of data systems are developed and promoted

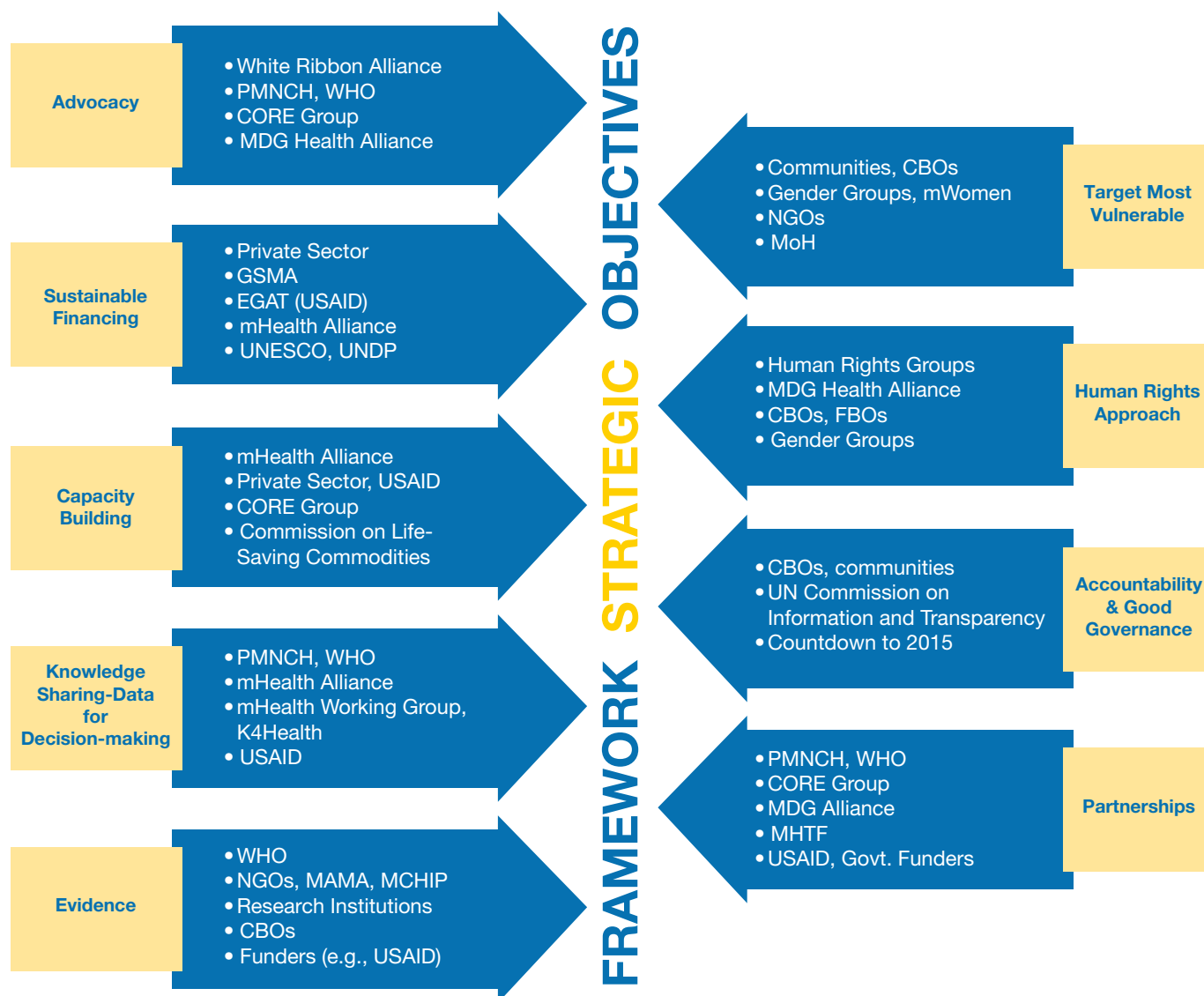
APPENDIX “D” – Gender Mainstreaming and Women’s Empowerment: Illustrative Outcomes/Milestones

Strategic Objective	Illustrative Outcomes/Milestones
Gender Mainstreaming and Women’s Empowerment	
Women as clients	<ul style="list-style-type: none"> - A situational analysis is performed, documented and disseminated to key stakeholders identifying gender related issues that impact women’s ability to make health decisions and their access to quality MNCH and related health information and services (e.g., privacy and confidentiality laws, policies and customs) - A situational analysis is performed, documented and disseminated to key stakeholders identifying gender related issues that impact women’s ability to own and use mobile phones - Existing tools for gender mainstreaming and empowering women that can be contextualized to health and the use of mobile are mapped - Existing tools for gender mainstreaming and women’s empowerment are contextualized for mHealth; new tools are developed as appropriate - Framework for mainstreaming gender and empowering women as clients of mHealth is developed and promoted with key stakeholders - Tools are validated in various LMIC contexts - Policy analysis is performed on results of situational analyses to develop key advocacy messages and strategies for policymakers - Stakeholders (men and women) are trained and sensitized with tools for mainstreaming gender and empowering women - Evidence is collected, documented, analyzed for policy implications and disseminated to key stakeholders - Policies and laws are adopted addressing barriers and obstacles related to gender and mHealth; communities sensitized to gender related barriers to mHealth (access and use of mobile and health services)
Women as service providers	<ul style="list-style-type: none"> - Outcomes/milestones same as above but addressing gender dynamics and obstacles associated with women community health workers using mobile phones in their work (e.g., exposure to gender based violence in the community because of mobile ownership and usage)
Women as designers	<ul style="list-style-type: none"> - Outcomes/milestones same as above but addressing gender dynamics and obstacles associated with women as designers of mobile applications to be used by and serve women as clients and service providers (e.g., women and girls accessing science, mathematics, engineering classes)
Women as policymakers and policy influencers	<ul style="list-style-type: none"> - Outcomes/milestones reflect ensuring that gender dynamics are addressed in policies and that women’s voices and perspectives are incorporated into policymaking and policy implementation

APPENDIX “E” – Operational Priorities: Illustrative Activities

Operational Priorities	Illustrative Activities
Advocacy	<ul style="list-style-type: none"> - Presenting evidence-based messaging about mHealth to global health specialists, NGOs, Ministries of Health, funders and policymakers at one-on-one meetings and global forums
Sustainable Financing	<ul style="list-style-type: none"> - Identify business models for using mHealth - Promoting and supporting group savings and loans. Social enterprises and franchise models connected with ICT and MNCH - Promote mVouchers to remit conditional cash transfers
Capacity Building	<ul style="list-style-type: none"> - Workshops and web-based seminars on how to mainstream gender and mHealth - Building research capacity to evaluate mHealth - Building policy analysis skills for using mHealth evidence - Building capacity of district health officials to monitor medical and drug supplies - Protocols for CHWs to deliver integrated interventions
Knowledge Sharing Data for Decision making	<ul style="list-style-type: none"> - Policy analysis to synthesize mHealth evidence - Using targeted and global forums to share mHealth evidence and implementation best practices - Applying value chain analysis to evidence to evaluate where mHealth might add value to service delivery
Evidence	<ul style="list-style-type: none"> - Promoting, collecting and curating quality evidence on the impact of mHealth - Implementation science to evaluate best practices in the field - Research on gender and social drivers and barriers to mHealth

APPENDIX “F” – Operational Priorities, Guiding Principles and Illustrative Stakeholders



ENDNOTES

- ¹ See, e.g., *Countdown to 2015, Maternal, Newborn & Child Survival: Building a Future for Women and Children, The 2012 Report* (WHO and UNICEF 2012). (hereinafter, “2012 Report”).
- ² For example, the issue of standards and interoperability best practices is a key technology. Effective integration is dependent upon everybody using the same terminologies and harmonizing best practices for achieving interoperability. These include country-level norms, guidelines, legislation, and even international agreements, etc. Initiatives such as the Maternal Health Concept Lab are working toward harmonizing the MNCH terminology being used in mHealth. The International Standardization Organization Technical Committee 215 is working toward standardization in the field of information for health and ICT, promoting interoperability between independent systems, to enable compatibility and consistency for health information and data, as well as to reduce duplication of effort and redundancies.
- ³ See, e.g., Bhutta, Z. A., Ali, S., Cousens, S., Ali, T. M., Haider, B. A., Rizvi, A., Okong, P., et al. (2008). Alma-Ata: Rebirth and Revision 6 Interventions to address maternal, newborn, and child survival: what difference can integrated primary health care strategies make? *The Lancet*, 372(9642), 972-989. Elsevier Ltd. Retrieved from <http://www.ncbi.nlm.nih.gov/pubmed/18790320>
- ⁴ See, e.g., Holt, R. L., & Mikati, M. A. (2011). Care for child development: basic science rationale and effects of interventions. *Pediatric Neurology*, 44(4), 239-253. Elsevier Inc. Retrieved from <http://www.ncbi.nlm.nih.gov/pubmed/21397164>; Kerber, K. J., De Graft-Johnson, J. E., Bhutta, Z. A., Okong, P., Starrs, A., & Lawn, J. E. (2007). Continuum of care for maternal, newborn, and child health: from slogan to service delivery. *The Lancet*, t370(9595), 1358-1369. Elsevier. Retrieved from <http://www.ncbi.nlm.nih.gov/pubmed/17933651>
- ⁵ See, 2012 Report; Countdown to 2015 Decade Report (2000-2010), Taking Stock of maternal, newborn and child survival (World Health Organization and UNICEF 2010) (hereinafter “Decade Report”); Hogan, M. C., Foreman, K. J., Naghavi, M., Ahn, S. Y., Wang, M., Makela, S. M., Lopez, A. D., et al. (2010). Maternal mortality for 181 countries, 1980-2008: a systematic analysis of progress towards Millennium Development Goal 5, *The Lancet*, 375(9726), 1609-1623. Elsevier Ltd. Retrieved from <http://www.ncbi.nlm.nih.gov/pubmed/20382417>; You, D., Wardlaw, T., Salama, P., & Jones, G. (2010). Levels and trends in under-5 mortality, 1990-2008, *The Lancet*, 375(9709), 100-103. Retrieved from <http://linkinghub.elsevier.com/retrieve/pii/S0140673609616019>.
- ⁶ ITU World Telecommunications/ICT Indicators Database (International Telecommunication Union 2012)
- ⁷ The “Three Delays” model proposes that pregnancy-related mortality is overwhelmingly due to delays in: (1) deciding to seek appropriate medical help for an obstetric emergency; (2) reaching an appropriate obstetric facility; and (3) receiving adequate care when a facility is reached. See, e.g., Barnes-Josiah, D., Myntti, C., & Augustin, A. (1998). The “three delays” as a framework for examining maternal mortality in Haiti. *Social science medicine*. Retrieved from <http://www.ncbi.nlm.nih.gov/pubmed/9579750>.
- ⁸ Hutchings, M.T. et al., 2012. *mWASH: mobile phone applications for the water, sanitation, and hygiene sector*. Oakland, CA, USA: Pacific Institute and Los Angeles, CA, USA: Nexleaf Analytics. 114 p. : 12 fig., 4 tab. 95 ref. Available at: http://www.pacinst.org/reports/mwash/full_report.pdf [Accessed 18 May 2012].
- ⁹ See “eHealth Readiness Survey” (WHO ?); The WHO-ITU eHealth National Strategy Toolkit (June 2012); Global eHealth Observatory Report (WHO 2011).
- ¹⁰ See e.g., The Partnership for Maternal, Newborn & Child Health, Strategic Framework 2012-2015 (World Health Organization 2011), at 8.
- ¹¹ The WHO mHealth and ICT Framework describes the potential value of mHealth solutions in strengthening health systems across the RMNCH Continuum. *WHO mHealth and ICT Framework for RMNCH* (developed in collaboration with JHU GMI by Lavanya Vasudevan, Alain Labrique and Garrett Mehl for the WHO mHealth Advisory Group (mTag) on Evidence, Impact and Scale in Reproductive, Maternal, Newborn and Child Health.
- ¹² See Monitoring the Building Blocks of Health Systems: A Handbook of Indicators and their Measurement Strategy (World Health Organization 2010); Health Systems Strengthening (PEPFAR), <http://www.pepfar.gov/strategy/ghi/134854.htm>.
- ¹³ See Splettstoesser, D., & Kimaro, F. (2000). Benefits of IT-based decision-making in developing countries. *The Electronic Journal of*

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- ¹⁴ UN Commission on Life-Saving Commodities for Women and Children, Commissioners' Report, September 2012, *Every Woman Every Child* (United Nations 2012).
- ¹⁵ Commission on Information and Accountability for Women's and Children's Health, *Keeping Promises, Measuring Results, Every Woman Every Child* (World Health Organization 2011).
- ¹⁶ Email from Sean Blaschke, Child Survival Systems Strengthening Specialist, UNICEF, Oct. 31, 2012.
- ¹⁷ See Schweitzer, J., & Synowiec, C. (2012). The Economics of eHealth and mHealth. *Journal of Health Communication*, 17(sup1), 73-81. Retrieved from <http://www.tandfonline.com/doi/abs/10.1080/10810730.2011.649158>.
- ¹⁸ See, e.g., Electronic protocols improve child health in Tanzania, Retrieved from <http://www.fic.nih.gov/News/GlobalHealthMatters/jan-feb-2012/Pages/mhealth-children-tanzania.aspx>.
- ¹⁹ Mechael, P., & Searle, S. (2010). Barriers and Gaps Affecting mHealth in Low and Middle Income Countries : Policy White Paper, Columbia University. Earth Institute. Center for Global Health and economic development (CGHED 2010): with mHealth Alliance. Retrieved from http://www.mobileactive.org/files/file_uploads/mHealth_Barriers_White_Paper.pdf.
- ²⁰ See, e.g., Crichton, R., Moodley, D., Pillay, A., Gakuba, R., Seebregts, C., An Architecture and Reference Implementation of an Open Health Information Mediator: Enable Interoperability in the Rwanda Health Information Exchange (2012). Retrieved from <http://www.cair.za.net/research/outputs/architecture-and-reference-implementation-open-health-information-mediator-enabling>.
- ²¹ See, e.g., Mbizvo, M. T., & Bassett, M. T. (1996). Reproductive health and AIDS prevention in sub-Saharan Africa: the case for increased male participation. *Health San Francisco*, 11(1), 84-92. Retrieved from <http://www.ncbi.nlm.nih.gov/pubmed/10155880>; Striving and Surviving: Exploring the Lives of Women at the Base of the Pyramid (GSMA mWomen 2012).
- ²² Women and Mobile: A Global Opportunity (GSMA mWomen 2010).
- ²³ Striving and Surviving: Exploring the Lives of Women at the Base of the Pyramid (GSMA mWomen 2012).
- ²⁴ Id.
- ²⁵ See, e.g. CARE's Gender Mainstreaming tools at <http://gender.care2share.wikispaces.net/Gender+Equity+and+Diversity+work+at+CARE>.
- ²⁶ Dalberg research and analysis from World Bank's "Study on Mobile Applications for the Health Sector"; Mechael, P., & Searle, S.
- ²⁷ Id.



The mHealth Alliance champions the use of mobile technologies to improve health throughout the world. Working with diverse partners to integrate mHealth into multiple sectors, the Alliance serves as a convener for the mHealth community. The mHealth Alliance also hosts Health Unbound (HUB), a global online community for resource sharing and collaborative solution generation. For more information, visit mHealthAlliance.org.