Mobile Tools for Health Workers
Targeting Neonatal Health in Low-Resource Settings

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10 Countries with highest annual Neonatal Mortality

FIGURE 1: This graph represents global under-five, infant and neonatal mortality rates between the years 1990 and 2012. The rate has almost halved since 1990 but we still have work to do.
Global Causes of Newborn Deaths

- **Complications from Preterm Birth**: 35%
- **Complications during Childbirth**: 23%
- **Neonatal Infections**: 28%
- **Diarrhoea**: 2%
- **Sepsis and Meningitis**: 13%
- **Pneumonia**: 11%
- **Congenital**: 9%
- **Tetanus**: 2%
- **Other**: 6%

The 3 main causes of all newborn deaths are preventable and treatable.

Majority of neonatal deaths occur in the first week of life and, of those, the majority take place in the first 24 hours.

Of the estimated 3.6 million newborns that die every year in the first 4 weeks of life, 1.4 million stillbirths and 1.5 million neonatal deaths are attributable to maternal health complications.
Maternal interventions with demonstrated impact on neonatal mortality

- Birth spacing
- Prevention of indoor air pollution
- Prevention of intimate partner violence
- Antenatal care
- Doppler ultrasound monitoring during pregnancy
- Insecticide-treated mosquito nets
- Birth and newborn care via community-based intervention packages
- Emergency obstetric care
- Elective induction for post-term pregnancy
- Cesarean delivery for breech presentation
- Prophylactic corticosteroids in preterm labor
- Early initiation of breastfeeding

Coverage of Key Interventions

Countdown to 2015. Accountability for Maternal, Newborn and Child Survival: 2013 Update. Note: median for 75 Countdown priority countries with available data; bars refer to ranges between countries.
The mHealth Compendiums document a range of mHealth applications implemented throughout Africa and, in some exceptional cases, in other regions of the world. This summary synthesizes and highlights case study material to help USAID missions and other interested parties identify and access information contained within the Compendiums.

**61 Case Studies**
- Covered five programmatic areas:
  - 14 Behavior Change Communication
  - 12 Data Collection
  - 6 Finance
  - 11 Logistics
  - 18 Service Delivery

The majority of mHealth projects only required a basic mobile phone, while 11 projects utilized smartphones and 4 utilized tablets.

**Case Studies Addressed Various Application Categories**
- 9 Diagnostic and treatment support
- 2 Disease and epidemic outbreak surveillance
- 16 Education and Awareness
- 6 Healthcare financing
- 4 Healthcare worker communication and training
- 28 Remote data collection and access
- 8 Remote monitoring

**Geographic Location**
- 2 Bangladesh
- 2 Pakistan
- 3 India
- 1 Philippines
- 3 United States
- 1 Ireland
- 1 United Kingdom

**Nationwide Implementation**
- 24 projects were scaled nationwide
  - 17 engaged the government
  - 5 were used by over 10,000 clients
  - 2 trained over 1,000 staff
  - 1 was a point-of-care diagnosis tool
  - 10 were a supply chain management tool

**Program Types**
- 15 HIV/AIDS
- 7 Malaria
- 19 Maternal and child health
- 4 Tuberculosis

**Functions**
- 42 Short message service
- 2 Interactive voice response
<table>
<thead>
<tr>
<th></th>
<th>12 Common Applications of mHealth Tools</th>
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<tbody>
<tr>
<td>1</td>
<td>Client education &amp; behaviour change communication (BCC)</td>
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<td>2</td>
<td>Sensors &amp; point-of-care diagnostics</td>
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<td>Electronic health records</td>
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<td>6</td>
<td>Electronic decision support Information, protocols, algorithms, checklists</td>
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<td>7</td>
<td>Provider-to-provider communication User groups, consultation</td>
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Research Question

“What success has been shown with mHealth-based interventions and strategies for clinical and non-clinical health workers in low and middle-income countries specifically targeting neonatal health?”
Summary of Content

• 9 studies identified
  – 7 quantitative
  – 1 qualitative
  – 1 mixed methods

• No relevant research looking at neonatal mortality or morbidity as an endpoint

• Most studies focused on documenting change in process indicators

• Included particularly relevant case studies from limited landscape scan
LMIC interventions that improve health and survival of preterm babies

- Maternal prophylactic corticosteroids
- Antibiotics following preterm rupture of fetal membranes
- Delayed cord clamping
- Vitamin K supplementation
- **Case management of neonatal sepsis**
- Room air for resuscitation
- Kangaroo mother care
- Early breastfeeding
- Thermal care
- Surfactant therapy
- Continued distending airway pressure for respiratory distress syndrome

mHealth Evidence

• 2012 - Gisore et al. “Community Based Weighing of Newborns and Use of Mobile Phones by Village Elders in Rural Settings in Kenya: A decentralized Approach to Health Care Provision”

• 2008 - DeRenzi et al. “e-IMCI: Improving Pediatric Health Care in Low-Income Countries”

• 2012 - Mitchelle et al, “Perceived Improvement in Integrated Management of Childhood Implementation Through Use of Mobile Technology: Qualitative Evidence from a Pilot Study”
CHILD MODULE

- **Newborn Postpartum Visit**
  - Modify identification info for infant and mother, and update DOB information

- **Breastfeeding Assessment**
  - Information about health status of child after 2 years of age to close case from CommCare

- **Newborn Routine Immunization**
  - BCG, OPV, DPT, Boosters, Polio, Measles, Vitamin A

- **Newborn Routine Immunization Counsel**
  - Information about vaccines, benefits of immunization, side effects, how/where to get immunized

- **Update Baby Info**
  - Update any details about the newborn case

- **Close Baby**
  - To be filled to close the baby case after 2 years of care and full immunization

Bhavsar M, Hensley M. Dimagi and Catholic Relief Services, 2013
Maternal & Newborn Danger Signs
Topic available throughout postpartum period (42 days after delivery); Postpartum/maternal danger sign counsel shows if mother is alive; Newborn danger sign counsel shows if baby alive.

Essential Newborn Care
Topic available during first 7 days of life. Content includes: delayed bathing, immediate & exclusive breastfeeding, colostrum feeding, cord care

Exclusive Breastfeeding
Topic available up to 6 months after delivery.

Special care for low birth weight/premature babies
Topic available throughout postpartum period (42 days after delivery). Content includes: extra warmth for lbw, frequent breastfeeding, and prevention of infection
LMIC interventions to reduce neonatal mortality from intra-partum causes

- Careful monitoring of the fetal heart tones via auscultation with a fetoscope or handheld Doppler device to identify abnormal fetal heart patterns
- Use of the partograph during labor to correctly identify prolonged and/or obstructed labor
- Access to timely Cesarean delivery
- Access to high quality emergency obstetric care
- Simplified Neonatal Resuscitation (HBB)

mHealth Evidence

• 2012 - Lund et al, “Mobile Phones as a Health Communication Tool to Improve Skilled Attendance at Delivery in Zanzibar: A Cluster-Randomized Controlled Trial”

• 2012 Ngabo et al, “Designing and Implementing an Innovative SMS-based Alert System (RapidSMS- MCH) to Monitor Pregnancy and Reduce Maternal and Child Deaths in Rwanda”

• MCHIP – Maternal and early Neonatal Health Quality of Care (MNH QoC)
mHBB Data Collection and Reporting System

**SET-UP**
Trainer coordinates with health facility administrator and other MOH officials to identify available trainees and set up HBB course.

**REGISTRATION**
Trainees notified by SMS message with request to register for course. Trainees receive confirmation and course reminders via SMS.

**PRE-TEST**
Trainee registers for course and completes Written Knowledge Pre-test using SMS text messaging.

**HBB COURSE**
Trainee receives SMS confirmation of Trainee registration. Trainee attends course; Trainee completes course evaluations.

**POST-TEST**
Trainee completes Written Knowledge post-test using SMS text messaging.

**SURVEYS**
Trainees and Trainers complete Course Surveys using either SMS messaging or smartphone.

**REFRESHER**
Just-in-time video refresher training, with pre-test/post-test questions.

**MOTIVATIONAL MESSAGING**

**SECURE ACCESS**

**TECHNOLOGY PLATFORM**

**DATABASE**

**WEB SERVER**

**BI-DIRECTIONAL STAKEHOLDER REPORTING**

**HBB Providers**

**Community Health Workers**

**HBB Champions Health Facility**

**Regional Orgs**

**National Orgs**

**International Orgs**

**POTENTIAL REPORTING DOMAINS**

- Resuscitation Debriefing
- Birth Registry
- Early postnatal follow-up
- Perinatal Audit
- Morbidity/Mortality Indicators
- NR Commodity Surveys
- Clinical Mentoring
- Resource allocation
- Supply chain logistics; commodities tracking
- Cost-analysis
- HMIS indicators
- M & E indicators
LMIC interventions to reduce neonatal mortality from infectious causes

- Treatment of maternal urinary and genital tract infections
- Antibiotic treatment of mothers with preterm premature rupture of membranes
- Chlorhexidine application to the umbilical cord stump
- Kangaroo mother care (KMC)
- Early and exclusive breastfeeding

mHealth Evidence

• 2012 - Seidenberg et al, “Early Infant Diagnosis of HIV Infection in Zambia Through Phone Texting of Blood Results”

• 2013 – Binagwaho et al, “Scaling up Early Infant Diagnosis of HIV in Rwanda, 2008-2010”

• 2010 - Kaewkungwa et al, “Application of Smart Phone in “Better Border Healthcare Program”: A Module for Mother and Child Care”

Summary of Evidence

There is some evidence that use of mobile technologies by different levels of health workers in low resource settings can:

• Increase maternal ANC attendance and child immunization rates
• Increase skilled attendance at birth and facility delivery
• Increased registration of pregnancies and births
Summary of Evidence cont.

• Improve monitoring of quality of intrapartum care
• Help identify preterm and small babies
• Expedite early infant diagnosis of HIV
• Improve health workers use of IMCI algorithm
• Improve community survey processes for collecting data on breastfeeding practices
Opportunities for Newborn mHealth

• Supporting scale up of newborn resuscitation programs
• Mobile tracking systems for essential newborn commodities
• Creating tools for clinical decision support and documentation of intrapartum care
• Harmonization of newborn data collection to allow access to aggregate data sets
• Creating integrated systems where maternal and newborn data flow between different levels of healthcare system
Products + Partners + Platform

Products

- Electronic Health Record
- Patient Education, e-Consents, and Secure Messaging
- Online Appointment Scheduling

Partners

- Content (Childbirth Connection, Lamaze International)
- Applications (Good Measures nutrition app)
- Co-development partners (American Association of Birth Centers, American College of Nurse Midwives, MANA Stats)

Platform

- Data Registry and Health Information Exchange
CLINICIANS
- charting research data collection medical apps
+ education, shared decision making, and eConsents

WOMEN
- registration medical history experience surveys consumer apps

DATA

SECURE PLATFORM

Patient Education Tool --- Electronic Health Record --- Online Scheduler

HIPAA Compliance with Meaningful Consent*

research, performance reporting, quality improvement, decision support, consumer insights
Maternal Concept Lab:
Creating a Common Language for Electronic Maternal, Newborn and Child Health Data

MCL Standardized Terminology & Indicators

- Community Based MNCH Risk Assessment Data
- Clinic Based MNCH Data
- Hospital Based MNCH Data

Open Source Tools
- Cloud-based terminology services
- Repository of standards-based MNCH Content
- MNCH core data sets
- Interfaces between major platforms
- MNCH community of practice

Improved MNCH Data
- For evaluation, research, vital statistics and service improvement
Thank you!