M-health tracking of mother & Child health care details in rural areas of Andhra Pradesh, HM&FW Department, GoAP

Concept Note

CENTRE FOR GOOD GOVERNANCE
Knowledge • Technology • People

February-2013

Contents

I. Introduction

The efforts made by the Government of Andhra Pradesh over the past few years have resulted in improvement in the health and nutrition status of women and children. The Maternal Mortality Ratio (MMR- per 1,00,000 live births) has declined from 220 in 1997 (SRS 1997) to 134 in 2009 (SRS 2010) but remains much higher than the MMR of 81 in Kerala (SRS 2010). Similarly, the Infant Mortality Rate (IMR-per 1000 live births) has declined from 63 in 1997 (SRS 1997) to 46 in 2010 (SRS 2010). Further the percentage is still very high for (i) Low Birth Weight children at 19.4%, (ii) Pregnant Women (15-49 yrs) who are Anemic at 56% (NFHS-3)

The Current rate of decline in MMR & IMR is not up to the level expected and needs to improve significantly to achieve the MMR and IMR goals set as part of the Millennium Development Goals (MDGs). To achieve the MDG's there is a need for technology based system at village level for tracking the eligible couples, maternal mothers, antenatal checkups, Pregnancy outcome, post natal checkups, Infant health and immunization.

WHO defines m-Health as the "provision of health services and information via mobile technologies such as mobile phones and Personal Digital Assistants (PDAs)". M-Health tools have shown promise in providing greater access to healthcare to populations in developing countries, as well as creating cost efficiencies and improving the capacity of health systems to provide quality healthcare. Studies done in Kenya, Sierra Leone and Zanzibar unleash the immense potentialities this innovative concept holds in addressing a wide variety of healthcare challenges.

> *Using mobile technology to improve healthcare offers a tremendous opportunity for developing countries and communities to advance.*

M-Health software developed by CGG

The District Medical & Health office (DM&HO), Hyderabad initiated a project to track maternal and child health outcomes in slums of Hyderabad using mobile phones. The Centre for Good Governance (CGG) have developed a mobile phone based

> *Mobile technologies cannot physically carry drugs, doctors & equipment between locations, but they can carry and process information in many forms.*

maternal and child health outcome tracking system (mHealth) which is used by ANMs to register Ante-Natal Cases (ANCs) and track the pregnant woman through the entire chain of events involving ANC checkups, delivery, Post-Natal Checkups (PNCs), and all the immunizations over the entire 15 month period. The project was launched officially in June-2012 and is currently being implemented in 32 UHPs (Urban Primary Health Centres) in the Hyderabad district. From June-2012 to December-2012, using mobile technology in the "32" UHP's total number of ANC's registered are "7165", deliveries covered are "1632", total Immunization cases covered are "7171" and high risk cases covered are "3200" which are reasonably high when compared to the statistics for six months before introduction of Mobile technology in the "32" UHP's. The

project leverages the mobile technology which is on the move today. The project is helpful to track the high risk cases, migration cases and abortion cases. The system alerts the Medical officers to attend the high risk cases.
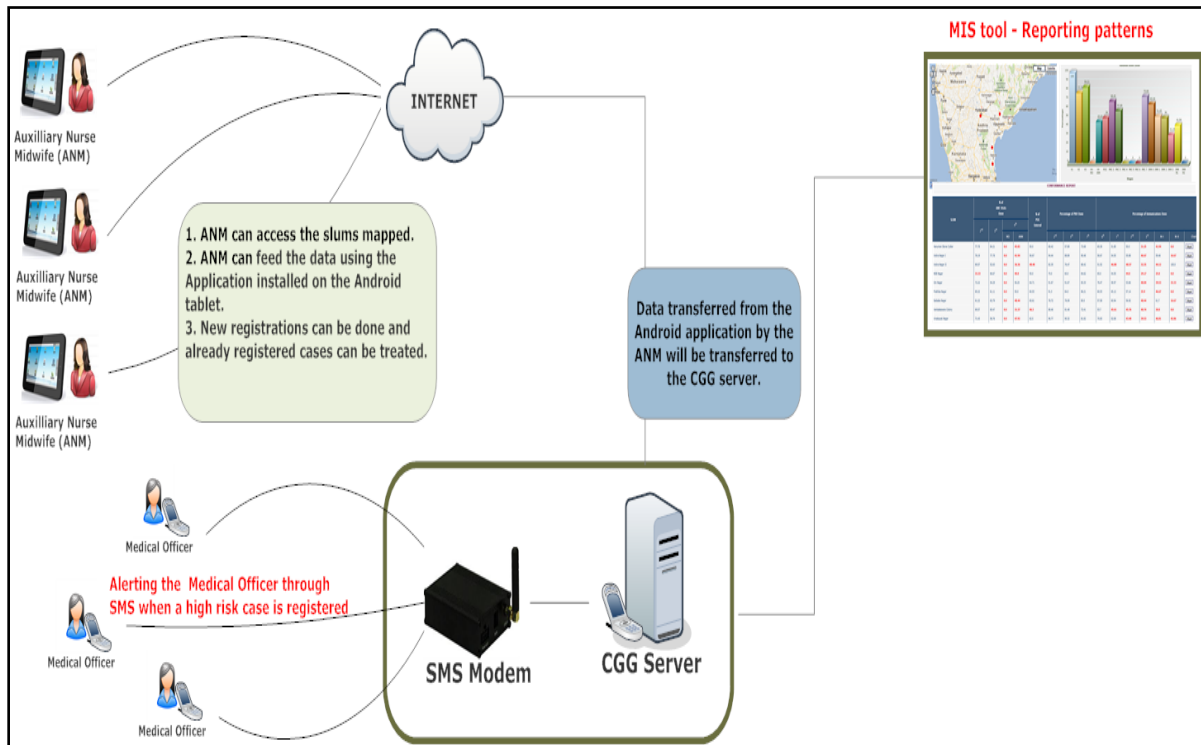

II. Proposed m-health Project to track the maternal and health care details in rural areas of Andhra Pradesh
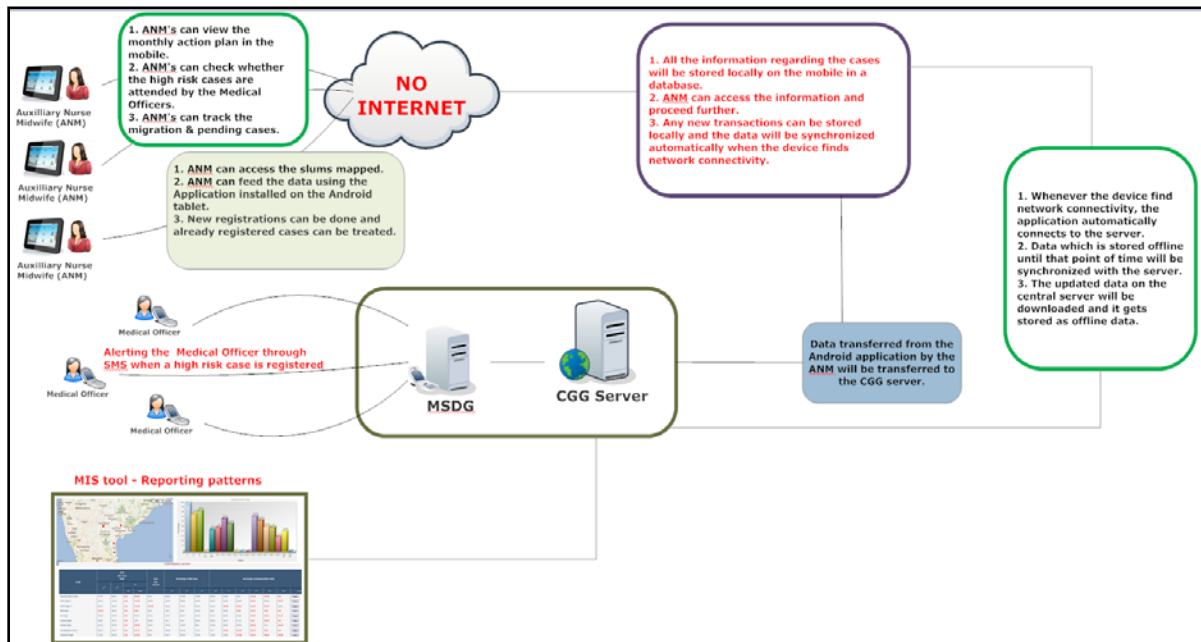
A. Objectives of the m-health project:

1. Registration of eligible couples and expected mothers.
2. Monitoring the track of pregnant mothers and infants which covers Antenatal checkups, High Risk cases details, Pregnancy outcome, Low Birth weight details, postnatal checkups and Immunization details.
3. Alerts to ANM regarding visits to pregnant and lactating mothers.
4. Alerts to Medical Officers regarding the High Risk Cases.
5. Generate summary reports for ANM Monthly Action Plans, ANM register details, delivery details, high risk cases details, ANM visit delay report and graphical reports.
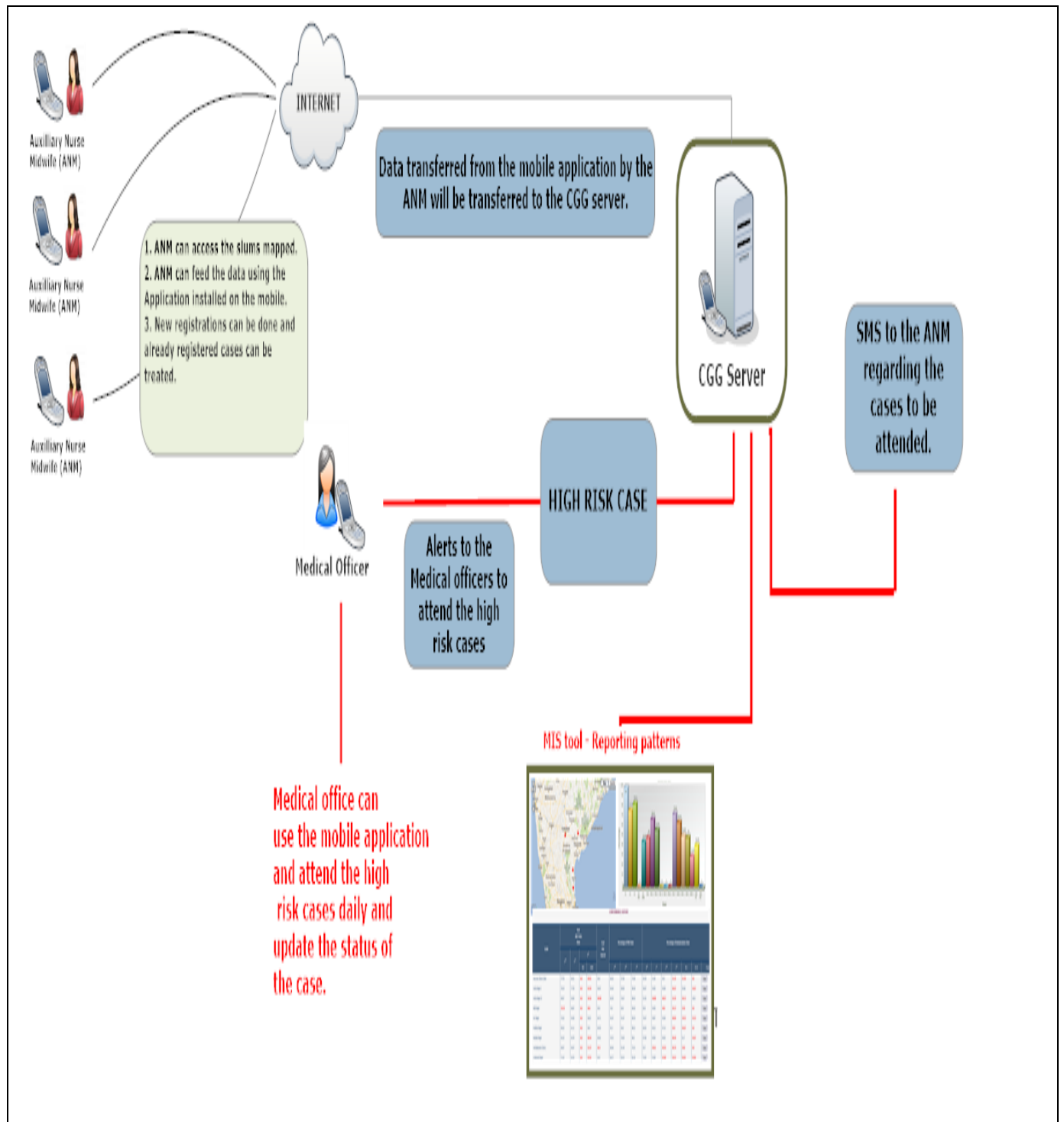
B. Proposed online work flow scenario – Urban & Rural areas

C. Offline work flow scenario – Rural areas

D. Work Flow Scenario for capturing High Risk Cases :

Auxilliary Nurse Midwife (ANM)

Auxilliary Nurse Midwife (ANM)

Auxilliary Nurse Midwife (ANM)

INTERNET

Data transferred from the mobile application by the ANM will be transferred to the CGG server.

1. ANM can access the slums mapped.
2. ANM can feed the data using the Application installed on the mobile.
3. New registrations can be done and already registered cases can be treated.

CGG Server

SMS to the ANM regarding the cases to be attended.

Medical Officer

HIGH RISK CASE

Alerts to the Medical officers to attend the high risk cases

Medical office can use the mobile application and attend the high risk cases daily and update the status of the case.

MIS tool - Reporting patterns

4

E. Database & Offline storage:

- In rural areas where there is no network connectivity on the mobile offline storage will be facilitated.
- Using the offline storage mechanism the data can be saved locally on the mobile/tablet.
- The data can be synchronized with the online database whenever the device finds network connectivity.
- Synchronization process can be done in two ways,
    - When the device finds network connectivity, automatically the application starts pushing the data stored offline with the mobile. At the same time the offline database also gets updated with the online data. The application has to check for the network connectivity at regular intervals which directly affects the battery level on the device. The utilization of the device battery can be brought down by decreasing the number of time intervals to check network connectivity.
    - The user has to go for the synchronizing process manually by clicking the specified button for synchronization in the application. The user needs to check for the network connectivity.

    ** Both the above options can also be provided.

F. Device – Smartphone or Tablet

- Android OS provides better storage mechanism which uses relational database storage mechanism.
- Huge volumes of data can be stored locally on the device as it supports storage in GB and if required can be extended.
- Tablet offers wide screen experience when compared with smartphone.
- User interfaces and reports can be viewed better on a "7 "inch tablet.
- Both smart phone and tablet comes at the same price.
- GPS functionality can be leveraged to provide the GPS parameters (latitude, longitude) which are used for Geotagging.
- **Drawbacks of the tablet**
    - Battery backup of a tablet will be low when compared with a Smartphone. Touch sensitivity will not be as good as smart phone as many tablets are coming with capacitive touch and not with IPS touch functionality.

G. Technical Specification

i. Details of Tech Specifications:

Programming Language   -   **Java Platform (JDK) 7u10**

Development of mobile Application   -   **ANDROID SDK**

Integrated Development Environment   -   **MyEclipse 10.1**

Database for MIS application   -   **PostgreSQL 9.2.2**

Database for Mobile Application   -   **SQLite**

(Offline Storage)

Testing the mobile application   -   **Android Emulators**

Porting the mobile application   -   **Android**

Smartphone/Tablet PC

Hosting Server   -   **Apache Tomcat 6.0**

Web Services   -   **Rest based Web Services**

ii. Smartphone /Tablet PC specifications

4.0-inch (480 × 800 pixels) IPS display / 7.0 inch IPS display

Android 4.0 (Ice Cream Sandwich) OS

1 / 1.2 GHz dual-core processor

5MP Auto Focus Camera

3G (HSDPA 7.2Mbps)

Wi-Fi 802.11 b/g/n

Bluetooth

GPS with support for Google Maps, Geotagging

4GB of internal memory

Expandable memory up to 32GB with micro SD

A minimum of 1400 mAh battery for smaprtphone / 4500 mAh battery for

Tablet PC

H. Monthly Action plans & Reports on the mobile

- Reports with the most important information will be made available on the mobile app. For example Monthly action plan with details of cases to be attended for the month, on any particular day the list of cases that are to be attended by the ANM , geographically the habitations to be covered, Pending high risk cases to be attended by the Medical Officer etc…

- Pending cases shall be reminded to the ANM in the form of notifications in the mobile app.

- High risk cases that are yet to be attended shall be alerted to the ANM, Medical Officer through **Alarm functionality (audio functionality).**

- All the high risk cases that are attended by the Medical Officer shall be pushed to the ANM for further treatment. All these cases shall be provided as a separate report to the ANM on the mobile.

- **Graphical reports** shall be facilitated in the mobile app which can be weekly, bi-weekly, monthly, quarterly etc. The graphical reports will show the progress of the ANM in terms of both normal and high risk cases.

I. Geo-tagging (GPS parameters)

- The GPS parameters can be captured if the phone/tablet supports GPS hardware.

- The accuracy of the GPS parameters retrieved depends on the quality of the hardware used and atmospheric conditions.

- The GPS parameters can be projected on a Google Map which gives a pictorial representation.

- Color representation can be used to differentiate the ANM who are constantly sending the data and who are not sending the data, for ex: green color who are sending the data daily, blue for those who did not send from the last three dates, red for those who did not send from last seven days etc.

- All the GIS related information shall be projected on a Google Map.

➢ Through SMS alerts the ANM's will be communicated daily regarding the cases they need to take up on a particular visit according to their visit schedule.

➢ SMS alerts to ANM contain the ANC (Pregnant women) name, visit phase and her slum.

➢ SMS alerts will also be sent to the ANC (Pregnant women) to make her realize that the ANM will be visiting her place for the next featured visit/phase.

➢ SMS alerts will be sent to the Medical Officers to intimate them about the high risk case.

➢ SMS alerts to the Medical Officers contains the ANC name, ANM name who attended the lady and the reasons for the high risk case.

➢ SMS alerts will be sent to the ANM in the early hours of the day before she makes visit to the slums.

➢ SMS alerts will be sent to the Medical Officers regarding the high risk cases to be attended by the ANM on a particular day.

➢ Alerts will help the ANM and the Medical officer to plan for attending the high risk cases immediately which is an important feature in the application.

➢ SMS alerts shall be sent to the higher officials regarding
   o The number of cases that are attended
   o Number of high risk cases out of the cases attended
   o Number of abortions
   o Number of temporarily / permanently shifted cases
   o Number of maternal deaths,
   o Number of deliveries etc.

➢ Provision also will be provided for health tips to pregnant women through SMS from best practices in other states in our country and also from different parts of the world.

K. Time lines for the Monthly generated action plan will be according to the following:

Phase	Time Line
ANC	
ANC Registration & First Visit Date	Date on registration was captured from the mobile. It takes the server clock and the date will be captured.
ANC Second Visit Date	**14 – 26 weeks** from the LMP date captured in the First Visit. The ANC will be shown in the monthly action plan starting from the 14th week and it will be shown until the 28th week if it is not done. If the 28th week is crossed, then report will be showing accordingly. SMS Alerts for 18th, 20th, 22nd, 24th weeks if the visit is not done.
ANC Third Visit Date	**26 – 34 weeks** from the LMP data captured in the First Visit. The ANC will be shown in the monthly action plan starting from the 26th week and it will be shown until the 34th week if it is not done. If the 38th week is crossed, then report will be showing accordingly SMS Alerts for 30th, 32nd, 34th, 36th weeks if the visit is not done.
ANC Fourth Visit Date	**1 week before EDD**
Pregnancy Outcome date	**280 days** +/- 14 days from the LMP date captured in the First Visit
PNC	
If the baby weight is less than 2.5 kgs then 2nd, 3rd, 4th, 5th, 6th, 7th followups are to be captured. *If the baby weight is 2.5 kgs and above then 2nd, 3rd, 7th followups are to be captured.*	

2nd Follow up	3rd day from the Date of delivery captured in the pregnancy outcome
3rd Follow up	7th day from the delivery date
4th Follow up	14th day from the delivery date
5th Follow up	21st day from the delivery date
6th Follow up	28th day from the delivery date
7th Follow up	42nd day from the delivery date
Immunization	
Zero Dose	Date of delivery
First Dose	6 weeks from the delivery date
Second Dose	10 weeks from the delivery date
Third dose	14 weeks from the delivery date
Measles –I	9 months from the delivery date
Measles – II	18 months from the delivery date

Depending on the requirement of the health department the complete proposed m-health application will be developed in local language Telugu for the benefit of users.

III. Advantages of the m-health project:

1. Monitoring the track of Pregnant Mothers (Antenatal Checkups, Pregnancy Outcome, and Post Natal Checkups) and infants (Immunization) using Mobile Technology.

2. Auxiliary Nursing Midwives (ANM) using Mobile Technology instead of Manual Registers (Paper work) for capturing Pregnancy checkups, low birth weight details, immunization and reporting through mobile application.

3. The Immediate SMS alerts to Medical Officers regarding the high risk cases which help in taking necessary immediate actions against high risk cases and thus reducing the maternal deaths and Infant deaths.

4. Graphical reports give an easy view of the number of normal Pregnant cases, High risk cases, abortion cases, and migrated pregnant cases

5. The Medical Officers and other higher health officials can monitor the working of ANM at the field level.

IV. Best Practices

As part of the proposed project, best practices will be studied from other states in India and also other countries where innovative m-health concepts have been introduced. Some of the m-health innovations include,

1. **E-mamta Project, Health Department, Government of Gujarat, India:** E-mamta is the project of Gujarat government which aims to minimize mother and infant death rate by providing vital health services at Pre and post delivery time. The Gujarat government has created an E-mamta software with help of National Rural Health Mission (NRHM) and National Informatics Center (NIC). This software will register and keep a track of pregnant women and children between age group of zero to six. It will also track pre and post delivery checkup of mothers and vaccination and growth charts of children. Parents will be informed about their next action in prior through SMS.

2. **Mobile Alliance for Maternal Action (MAMA):**
   The Mobile Alliance for Maternal Action (MAMA) launched by United States Agency for International Development (USAID) engages an innovative global community to deliver vital health information to new and expectant mothers through mobile phones. Timed messages to mothers include tips on everything from proper nutrition, newborn care, breastfeeding, immunizations, and connections to local health resources MAMA is a public-private partnership launched in May 2011 by the United States Agency for International Development (USAID) and Johnson & Johnson with supporting partners – the United Nations Foundation, mHealth Alliance and BabyCenter.

3. **Child Count+ Project, Kenya:** The project maintains real time database covering Kenya's children, including immunization and health risks using data uploaded by community health workers via SMS. The project's main interventions include management of acute malnutrition and the diagnosis and treatment of malaria. The results of the project include registration of 9,500 children by 108 health workers in three months time.

4. **Text4baby project, Haiti:** SMS-based service in the United States that delivers health information to pregnant women. The project helps in reduction of maternal mortality by educating pregnant mothers through SMS concept.

V. References

1. G.O.Ms.no.249, Convergence to improve Health & Nutrition Status of Women & Children Interdepartmental Coordination for Effective Convergence- Launch of Maarpu Programme, HM&FW Department, GoAP.
2. Review article, High Neonatal Mortality Rates in Rural India: What options to explore.
3. Report on Mobile Applications for the Health Sector, ICT Sector Unit, World Bank, April 2012.