

**KEY RECOMMENDATIONS**

**Digitization of health data through mobile phones**

Considerable cost savings can be made in the health sector by the digitization of health data at the point of care through simple applications designed for mobile phones. Significant efficiencies can also be introduced to the process through digitization, leading to earlier detection of disease outbreaks and providing a valuable baseline for public health monitoring and planning.

**Adjustment of rules concerning paperwork procedures**

In order to incentivise health workers to use such mobile-based data entry applications, the existing rules concerning paperwork procedures need to be relaxed.

**Data protection and handling**

Due to the confidential nature of the data being transmitted, additional encryption may be needed. The data should be managed and be in the hands of national or regional health departments; especially those that are labelled as “personal health records.”

**System-to-System Interoperability**

Disease outbreak information should be standardized in a manner that it can be shared with other national organizations such as border control health authorities as well as across borders with neighbouring countries or global organizations, if required.

**WHY M-HEALTH?**

The recording and communication of health statistics in developing markets is a labor and paper-intensive process. Public Health Center (PHC) Nurses, Health Inspectors (HIs), health staff, and Integrated Disease Surveillance Program (IDSP) staff spend an enormous amount of time and paper transferring data between various forms and registries. Consequently, it takes a considerable amount of time for these statistics to reach decision and policy makers, and urgently required actions to be taken to mitigate disease outbreaks.

The growing reach and use of wireless networks and handheld devices, especially in rural areas offers a convenient alternative to the 100% paper route. Simple mobile phone applications can be utilized in health data entry and dissemination, and can aid the detection of adverse events through statistical analysis software tools.

**CASE STUDY: REAL TIME BIOSURVEILLANCE PROGRAM (RTBP)**

RTBP is a pilot program implemented by IITM's Rural Technology and Business Incubator, National Center for Biological Sciences, and LIRNEasia to investigate the conditions for effective deployment of wireless technologies in the collection of public health data, event detection, and the dissemination of event information (alerting) through the use of three software modules and web interfaces. The project was conducted in the Sivaganga district, Tamil Nadu, between June 2008 and July 2010 with the Sivagana Deputy Director of Health Services and 4 Primary Health Centres in Thirupathur block.

**Data Collection**

**mHealthSurvey** is a data entry software that works on any standard Java-enabled mobile phone. A typical record contains the patient visitation date, location, gender, age, disease, symptoms, and signs. Data is transmitted over GPRS cellular networks.

**Event Detection**

**T-Cube Web Interface** (TCWI) is an Internet browser based tool to visualize and manipulate large spatio-temporal datasets. Epidemiologists can pin down a potential outbreak of for instance, a gastrointestinal disease among children in the Thirupathur block.

**Alerting**

**Sahana Alerting Module** (SAM) is a single input multiple output software capable of disseminating alerts to targeted recipients in the form of SMS, Email, and Web. SAM allows for the generic dissemination of localized and standardized interoperable messages.

### How RTBP works:



**FIGURE 1: DATA COLLECTION, EVENT DETECTION, AND ALERTING WORK FLOW**

1. Health records digitized by health workers in Thirupathur block using mobile phones.
2. Disease, symptoms, and demographic information transmitted across GSM mobile network to central database.
3. Data analysed by trained staff at the IDSP and PHC departments.

4. Automated event detection algorithms process a daily ranked set of possible disease outbreaks, which are presented to IDSP and PHC staff.
5. List of possible outbreaks examined by IDSP and PHC staff to determine likelihood of an adverse event.
6. Confirmed adverse events disseminated to Medical Officers, HIs, nurses, and other health officials, within affected geographic area.
7. Condensed version of the alert pushed through SMS to get immediate attention of the recipients.
8. More descriptive message emailed and published on the web (also accessible through mobile phone).

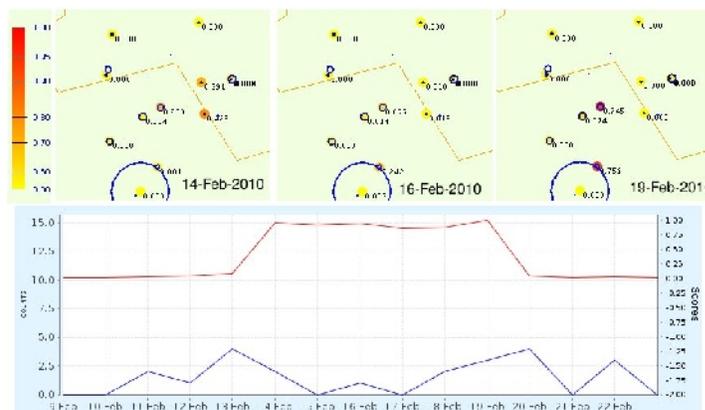
### BENEFITS OF M-HEALTH SEEN THROUGH THE RTBP

Up until July 2010, a weekly average of 1,500 records have been collected from the 24 health sub centres and 4 primary health centers in the Thirupathur block through the mHealthSurvey.

**Outbreak detection:** The RTBP has proved effective with detected clusters of acute diarrheal disease, respiratory tract infection, dengue, and viral fever before the health departments came to know about those incidents through the normal process.

One such incidence is the 27 cases of a diarrhea detected through the automated communicable disease detection process in early February 2010. The disease propagation pattern (top of Figure 2) shows it initiating at two locations in the center (14-Feb-2010) and spreading south (16-Feb-2010), then escalating by 19-Feb-2010.

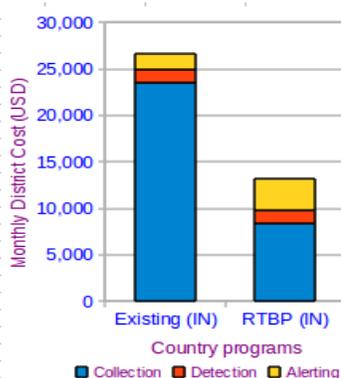
**Public health record building:** Reporting all disease and syndrome information from the point of



**2: DIARRHEA OUTBREAK, 14-19 FEBRUARY 2010**

care through m-health and analysing them in near-real-time is a prognostic active-surveillance approach for detecting and mitigating communicable and non-communicable diseases events. The resulting comprehensive database would be a valuable baseline for public health monitoring and planning.

**Cost effectiveness:** Data collection is the largest component of the cost of the existing system in India; the RTBP can reduce these expenses (Figure 3), while strengthening the system with rapid event detection of all diseases and alerting for better situational awareness.



**3: COST COMPARISON OF EXISTING SYSTEM VS RTBP**

### CONCLUSION

m-Health is cost effective and operationally efficient. RTBP has proven its capabilities to detect outbreaks well in advance. Health workers in India are capable of adopting the RTBP technology as part of their routine work. A challenge lies in determining the difficulties in scaling the RTBP state-wide in Tamil Nadu.

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