Epidemiology Unit Officials in India and Sri Lanka face problems in receiving health information in a timely manner which would enable the prevention of diseases from reaching epidemic states. Statistics on a priority list of infectious disease data, from regional and community health centers, continue to be gathered and analyzed largely through paper-based forms and procedures, and notifications are issued from the regional health administrations to local authorities using paper-based reporting. Experts in the field of biosurveillance and health informatics have argued that improvements in disease detection and notification can be achieved by introducing more efficient means of gathering, analyzing, and reporting of data from multiple locations as well as on a larger set of disease and syndromic information. New Information and Communication Technologies (ICTs) are regarded as an important means to achieve these efficiency gains.

The Real-Time Biosurveillance Program (RTBP) was a multi-partner research initiative that studied the potential for new ICTs to improve early detection and notification of disease outbreaks in Sri Lanka and India. RTBP established a pilot project involving village-level nurses in select districts, and an attempt to scale up the project began in March 2011 based on evaluation of the pilot.

Implementation date: June 2008 to December 2010

About RTBP
RTBP provides the ability to detect and monitor a wide variety of health events involving communicable, non-communicable, reportable and non-reportable diseases, and follows WHO’s general recommendations for disease surveillance systems. The RTBP infrastructure is composed of an interconnected network between healthcare workers via a mHealthSurvey mobile phone (J2ME) application, T-Cube web interface (TCWI) and Sahana Messaging/Alerting Module. Village level nurses are provided mobile phones with the mHealthSurvey custom software installed to message individual out-patient data in a prescribed format that is transmitted to a centralized database. The ICT system utilizes General Packet Radio Service (GPRS), while also storing records on the phone during times of limited or no connectivity.

Health facility health records, such as demographic information, symptoms, suspected and diagnosed diseases are collected through the mHealthSurvey that feeds into the TCWI, a browser-based statistical analysis software tool that uses cutting edge algorithms to detect adverse events. Health officials are notified of the adverse events using the Sahana Alerting module through SMS, email and web. Sahana is a free and open source software collection of disaster management modules that work as a platform for integrating multi-organization response efforts that provide critical information to responders’ communication needs.

Evaluation and Results
Initial findings show significant efficiency gains in terms of disease reporting, outbreak detection, and health alerting. Over the 15-month study, the project’s three components were successfully integrated into an operational system, which collected more than 450,000 and 130,000 patient records in Sri Lanka and India, respectively. A cost analysis also identified 35% savings in both countries when compared to the existing systems. Public Health Inspectors in Sri Lanka were able to detect a Chickenpox outbreak well in advance so they were able to notify the regional healthcare workers, enabling them to be better prepared. Similarly,
Nurses in India detected diarrhea outbreaks and identified the source of origin, which was a religious festival gathering. The value of collecting data on non-communicable diseases and non-priority communicable diseases were evident when TCWI revealed trends and population segments in specific geographic locations that were vulnerable to life-style-associated and respiratory diseases. Central healthcare workers were taking advantage of the Sahana Alerting tool to share investigation information with field-level health inspectors through SMS. Previously, the inspectors would have had to make a long journey to the central office to collect this paper-based information, and then, return to their village to conduct the investigation.

**Lessons Learned**

- Frontline health workers found the standard mobile phone numeric keypad difficult to use, particularly when entering large numbers of records.
- Many records entered into the system contained errors that could likely be eliminated through improved user interface design and a mobile phone application.
- While desktop computers, provided by the government, were harder to maintain and not often used, healthcare workers took it upon themselves to maintain the mobile phones as they served a dual purpose for both official and personal use.
- TCWI was able to apply statistical methods to detect data inconsistencies and entry errors, which the project verified as a result of occasional false reporting to maintain statistics to implicate job security.

**Conclusion**

The project demonstrated that new ICTs can dramatically reduce turnaround time for outbreak detection and alerting from weeks to a matter of days or even hours. It also demonstrated the feasibility of using low-cost mobile phones and existing commercial cellular infrastructure and services to enable affordable, real-time reporting of patient records from community health centers. However, further research is needed to better understand the challenges associated with scaling such a system up to a regional or national level. Further work needs to be done to optimize data entry over low cost mobile devices, to address usability and training requirements for the analytics platform, and to continue to enhance and integrate health notification into national and regional systems and practices.

**Geographic Coverage:** India, Sri Lanka

**Implementation Partners:** Carnegie Mellon University’s Auton Lab, USA; Epidemiology Unit, Ministry of Health and Nutrition, Sri Lanka; Indian Institute of Technology-Madras; LIRNEasia; National Center for Biological Science, Bangalore, India; National Institute of Communicable Diseases, Ministry of Family and Welfare, Tamil Nadu, India; Sarvodaya Shramadana Movement; University of Alberta

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**References:**


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