Evaluating a Real Time Biosurveillance Program

– A pilot project

Report of Interim Findings and Discussion Workshop

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1. Introduction

1.1.Background

The Real Time Biosurveillance Program (RTBP) was piloted at Sivaganga district of Tamil Nadu. The aim of RTBP is to strengthen existing disease surveillance and detection communication systems by collecting Outpatient disease, syndrome, and demographic data through a mobile phone application. The collected patient data was put through spatial and temporal statistical analysis using fast responding software and alert/situational-awareness messages of the detected adverse events was disseminated to health officials.

This RTBP interim findings discussion workshop aims to share with the audience the overview of the project goals and outcomes, share the research findings to decision-makers and policy advocates, investigate the strategies for policy influence to scale RTBP and outline the actions for the future of RTBP in India.

2. SESSION I - Inauguration

Ms. Suma Prashant (RTBI) welcomed the audience and explained the intent of this Workshop. A formal introduction was given by Prof Ashok Jhunjhunwala (IIT Madras), and the project partner organizations were felicitated. Mr. Nuwan Waidyanatha (LIRNEasia, Sri Lanka) briefly spoke about the scope and objective of this multi-party initiative. He also further introduced Prof Artur Dubrawski (Auton Lab, USA) to the audience, and the role of Auton Lab in this project. Prof Ashok Jhunjhunwala along with Dr.Raghupathy (DDHS, Sivaganga) formally inaugurated the workshop.

2.1.Present Disease Surveillance in India

The workshop's first speaker Dr. Vijayaraghavan from National Centre for Biological Sciences spoke on the present disease surveillance system in India and the need for technology in inducing transparency, effective information flow and sustainability. He highlighted on how still some processes are outdated, wherein we rely on much slower forms and tools for information gathering and disseminating.

He further elucidated on how the importance of technology in health data gathering can be twin fold, one to improve in fast transfer of data based on the priority of health indicators, the other being with visibility of data, Government can plan resource allocation.

2.2.Surveillance and Notification System in Sivaganga District

Dr. Raghupathy (Deputy Director of Health Services, Sivaganga) introduced the Integrated Disease Surveillance Project (IDSP) that was inaugurated by Honorable Union Minister of Health & Family Welfare in November 2004. He described IDSP as a decentralized State based Surveillance Program which intended to detect early warning signals of impending outbreaks and help initiate an effective response in a timely manner. He further explained the methodology, types of surveillance, organizational structure, reporting units and diseases/symptoms captured under the same, and the existing information flow channels. The different triggers, analysis and alerting notification mechanisms under the current processes were discussed.

Presentation link: Surveillance and Notification System in Sivaganga District

3. SESSION II – Project Overview

3.1.Present Disease Surveillance and Notification in Sri Lanka and Gaps

Dr. Ratnayake of the Provisional Director Health Services, Sri Lanka explained the objective, types, elements and cycle of public health surveillance in Sri Lanka. The steps include Collection of data, Compilation of data, Analysis & interpretation of data, Dissemination and feedback and Link to public health action. List of diseases under surveillance and proceeding on with appropriate investigation and surveillance was elaborated. As per his discussion, the weaknesses in this system are as follows, currently the surveillance is only Activated-passive and Passive Surveillance, there is a need for Active surveillance, Promptness is not very satisfactory and Lack of Laboratory Surveillance, Limited to inward cases; minimum contribution from OPD /Private sector.

Presentation Link: Present Disease Surveillance and Notification in Sri Lanka and Gaps

3.2. Overview of the RTBP implementation – country synergies, goals and main outcomes

Ms. Suma Prashant of RTBI gave an overview of RTBP implementation in India and Sri Lanka. The project partners, objectives and components were discussed in detail. The components include Digitization of patient health data through mHealthSurvey using mobile phone, Detection of unusual events using T-Cube Web Interface (TCWI) and SAHANA Messaging and Alerting Situational Awareness. She also gave an overview of the pilot in India and Sri Lanka and went about explaining the pilot in India in detail. The RTBP system was compared to the present day system in Sri Lanka and India. The qualitative and quantitative outcomes from the course of the pilot with respective to the 3 components were showcased to the audience.

Presentation Link: Overview of the RTBP implementation – country synergies, goals and main outcomes

4. SESSION III – Cost Benefit Analysis & Policy Brief

4.1. RTBP Evaluation framework and Cost Benefit Analysis

Dr. Ganesan of IITM's RTBI explained in detail about the evaluation framework that was conducted in evaluating the RTBP project and the results of the each method was discussed thoroughly. He also made presentation on the cost benefit analysis during which it was emphasized that the cost ($USD) per district per month in RTBP mHealthSurvey seems to be lesser than present paper based system.

Presentation Link: RTBP evaluation framework and cost benefit analysis

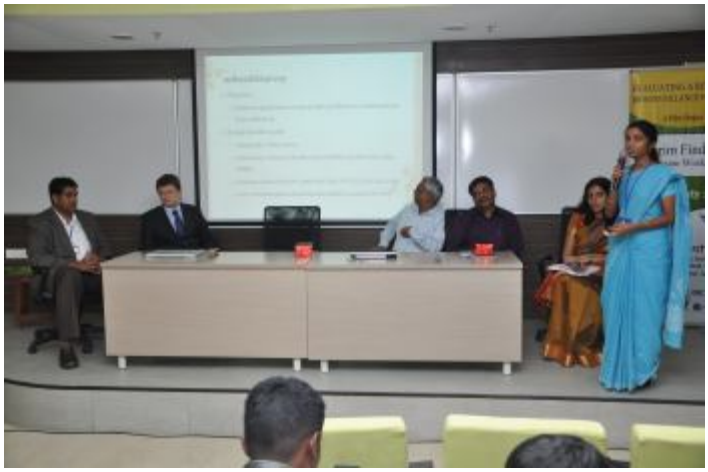
4.2. Policy brief and Paving the future

Ms. Suma of IITM's RTBI highlighted the key policy lessons learned in RTBP project. Based on the positive outcome, it was recommended that the RTBP project could be replicated in a wider scale and the mHealthSurvey application can also be used to capture other health related information like maternal, child health, chronic medical history management.

Presentation Link: Policy brief and paving the future

5. SESSION IV – RTBP Technologies and Challenges

5.1.mHealthSurvey R & D Challenges



Ms. Vincy of IITM's RTBI described the mHealthSurvey application that has been developed on mobile phone which was used for digitization of patient health data at both primary health centres and health sub centres. Objective of mHealthSurvey application, background research done before building the application, features built on mobile phone, specifications on mobile phone and process to be followed on mobile phone while initiating the data submission were explained. Finally, she had a detailed discussion on challenges that were encountered during the technology development and in the implementation phase.

Presentation Link: mHealthSurvey R & D Challenges

5.2.Data collection: lessons learned

The village health nurses, Ms. Dhanalakshmi and Ms. Palaniyayee of Thirukostiyur and Sevenipatty PHCs, respectively, shared their experiences and lessons learned from the project. Before intervention of RTBP project, they were only partially familiar with mobile phone usage for voice interaction and now they have became mobile phone literate both in data submission and voice interaction. The symptoms and signs of each disease that is being correspondingly displayed on the mobile phone help to reduce error rate in the data submission. In view of the current workload, they were not able to involve in 100 per cent data submission. The outbreak information that they receive on the mobile phone assists in taking preventive measures and follows up actions. At the end of their presentation, they mentioned that the RTBP project helps in monitoring of VHNs work in the villages also.

Presentation Link:Data Collection: lessons learned

5.3.T-Cube Web Interface (TCWI) R&D challenges

Prof. Artur Dubrawski of Auton Lab, CMU, USA, explained the challenges in T-Cube Web Interface (TCWI) which is being used in RTBP project for data analysis in detecting the potential adverse events. Four routine screening scenarios have been identified in this project to automatically execute the alert signal distribution on the map to see if the disease distributes in some specific spatio-temporal way. There is another improvement like multiple window size temporal scan where the most recent alert is not the most significant of those that could be issued recently. There are selected key remaining challenges and opportunities for further improvements in management of data, better maps, better pivot tables and user training. TCWI is also being used in other field like food safety, interactive analysis, astrophysics, learning locomotion, United Nations CTBTO.

Presentation Link: T-Cube web Interface R & D Challenges

5.4.Event detection: lessons learned

Ms. Kaliyammal, SHN of Thirukostiyur PHC, discussed the lessons learned in event detection through T Cube Web Interface. She has been using this software on the computer for detecting the unusual event detection in the period based on the interest of the location. In the analysis, they were able to find out the disease outbreak information like ADD, Fever etc during the period. It was highlighted that the data analysis system would enable them to act faster than paper-based method. She also requested the project team to develop other applications similar to mHealthSurvey on the mobile phone.

Presentation Link: Event detection: lessons learned

5.5.SAHANA messaging/alerting R&D Challenges

Dr. Chamindu Sampath of LIRNEasia, made a presentation on SAHANA messaging/alerting R & D challenges. He described the process to be followed in SAHANA messaging and alerting module. The challenges encountered both in India and Sri Lanka were discussed in detail under four layers such as social, application, content and technology.

Presentation Link: SAHANA messaging/alerting: R & D Challenges

5.6.Alerting/Situational-Awareness lessons learned

Mr. Ravi, Data Entry Operator of IDSP, presented the lessons learned in alerting/Situational Awareness. The event-detected information is sent to concerned health officials and health workers to initiate immediate action in order to prevent the disease spreading to other areas or regions. This process of disseminating information is user-friendly and also easily adoptable. He finished the discussion by stating that due to the time constraint, the dissemination tool was not effectively utilized in the current process.

Presentation Link: Alerting/Situational-Awareness lessons learned

5.7.Field implementation challenges

Mr. Janakiraman of IITM's RTBI, discussed about the field implementation challenges. As per the project activities being carried out in the field, the challenges were classified into three categories a) challenges in mobile phone data entry, b) challenges in TCWI & Sahana messaging/alerting module and c) challenges in general. He spoke about the list of challenges faced in all the three categories and put in forth to the project team and audience to consider these challenges before taking it to other areas or in the existing project area.

Presentation Link: Field Implementation challenges

6. Discussions

Prof Ashok Jhunjhunwala chaired the discussion session, prompting the audience to give their feedback and queries if any.

- Dr. Yuvaraj from National Institute of Epidemiology (ICMR), applauded the efforts of the project team, and mentioned that similar efforts in using technology for better health information systems began in the 1970's however innovations in the technology space did not provide that platform back then. This project has made the yesteryear vision into realty. It was pointed out that the results of this project should be taken up with concerning district officials for further scale-up.

  Now that we have experimented using GPRS enabled mobile phone for data entry, can we further use Voice assisted data entry wherever applicable, in this case even a cheapest phone would work as only a voice call would be required. What will be that model, ideal for scale-up?

- For which, the answer was that yes as a project, Biosurveillance has exhibited that it is feasible to use mobile phones for data capture. In this project, RTBI facilitated in technology development and implementation along with Government Support, however, in the longer run when scale-up is required – Government (Health System) will have to play the crucial role of scale-up.

- Since one can work both in voice as well as data, whether it is over a smart phone or an affordable phone, the technology should be agnostic of the end-instrument. Irrespective of what is the data-capture technology one uses, the data should still be able to go to the same database. The same applies to GSM based or for CDMA based phones. That is the direction; the project will be worked out on.

- Dr. Mohan Kumar of National Institute of Epidemiology (ICMR) noted that this entire technology aims to reduce the paper work of village health nurses and to enable them to spend their time in real health work. But when one uses mobile phone, it has its own limitations like the education status of the health workers who are handling the mobile phones and the ability of Village Health Nurses to type text rather than numbers are limited in that. Can a gadget be used that can handle all the forms, such that the contents are displayed in at least an A4 size, for comfort and ease of use?

- The answer for the above question was that the objective is not to just eliminate paper, we are looking at how are we going to have access to real-time data, so if a new gadget is introduced, one needs to be concerned of how will the data be transferred and also on a larger scale operation for replication. So it is wise to exploit the existing and available technology, for easier implementation especially when the available technology in this case mobile phone has a larger scope for deployment. Also, we need to keep in mind the cost factor, so even if one were to suggest using a MMS application to capture images of filled-in forms and transfer the same, we are aware that is going to be an expensive process.

- The points of entry of disease information are the Village Health Nurses, the question is here is again, are they capturing or will they be able to capture all the disease and symptomatic information of all patients? Possibly not. So tomorrow, one can have a system wherein the patient himself can enter the symptomatic information.

- The objective of this project was to evaluate if a real-time Biosurveillance is possible using mobile phone as data capture, given the current processes that exist on paper. We are not trying to eliminate paper but instead we are trying to see how one can fasten the information flow. Given that intent, this project has demonstrated successfully that mobile phones can be used to capture health data in rural scenarios by existing healthcare workers.

7. Closing remarks

The RTBP Project team would like to thank IDRC for their financial support in conducting this pilot project, we also convey our heartfelt gratitude to LIRNEasia - Sri Lanka, National Centre for Biological Sciences-Bangalore and Department of Health and Family Welfare Department, Tamil Nadu. We would further like to acknowledge the district level health officials and health workers affiliated to four PHCs of Thiruppathur block in Sivaganga district without whose support and participation the RTBP project could not have been the accomplished. We thank Auto Lab, CMU, USA, for their support and coordination in TCWI development and implementation. We also thank Vodafone for their service in mobile phone connection.

Finally, the workshop audience, eminent speakers, and workshop organizers are gratefully acknowledged for their every small effort in successful conduct of the workshop.

8. Press Conference

A Press Conference was held after the workshop to disseminate the research and findings to the participating press and media. An interactive session between the project team and the journalists from Times of India, The Hindu, The Indian Express, Dinamalar News Daily and Independent Bloggers, further highlighted and exchanged thoughts and views on the project and way-forward.

9. Participants List

S.No	Name	Organisation
1	Prof.Ashok Jhunjhunwala	IIT Madras
2	Dr.Vijayaraghavan	National Centre for Biological Sciences, Bangalore
3	Dr.Raghupathy	Deputy Director of Health Services (DDHS), Sivaganga
4	Nuwan Waidyanatha	LirneAsia, Sri Lanka
5	Chamindu	LirneAsia, Sri Lanka
6	Arthur Dubrawski	Auton lab CMU, USA
7	Micheal	Auton lab CMU, USA
8	Ratnayake	Health Services, Sri Lanka
9	Kaliammal	DDHS
10	Palaniyaye	DDHS
11	Dhanalakshmi	DDHS
12	Dr. Aslam A Nadmi	Centre for Insurance and Risk Management
13	Dr.R.Prabu	National Institute of Epidemiology (NIE) (ICMR)
14	Dr.Yuvaraj.J	NIE (ICMR)
15	Dr.Prabhdeep Kaur	NIE (ICMR)
16	A.Elangovan	NIE (ICMR)
17	Dr.Mohan Kumar	NIE (ICMR)
18	Dr.P.Anand Kumar	NIE (ICMR)
19	Dr.Bala Ganesa Kumar	NIE (ICMR)
20	R.Prabu	Institute of Financial Management and Research (IFMR)
21	D.Raja	IFMR
22	Eric Saltzman	IFMR
23	Akhil Behl	IFMR
24	Deepali Advani	IIT M
25	John Bosco Lordusamy	IIT M
26	M.Ramesh	IIT M
27	I. Naneji	IIT M
28	Anju Susan Thomas	IIT M
29	Neelima.K	IIT M
30	T.Ashokan	IIT M
31	A.C.V.Subrahmanyam	IIT M
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33	Aditya	IIT M
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35	Srinivasan.E	Startupstory
36	Prof.Anbudurai	Vel University
37	Ravi Sarogi	Uniphore
38	Siji Mathews	I-TECH

39	S.Chakrabarthy	I-TECH
40	R.Udhaya Kumar	Madras Press
41	S.Saranya	Madras Press
42	Saurav Das	Stanley Medical College
43	Satya Siddhartha	Stanley Medical College
44	Gurbeer Singh	Stanley Medical College
45	Suma	RTBI
46	Dr.Ganesan	RTBI
47	Vincy	RTBI
48	Vasumathi	RTBI
49	Prerana Nair	RTBI
50	Pallavi Chaudary	RTBI
51	Janaki Raman	RTBI
52	Bala	RTBI
53	Sudha.N	RTBI
54	Neeraja N Arjun	RTBI
55	Swarna	RTBI
56	Roopa	RTBI
57	S.Kavitha	RTBI
58	L.T.Annai Lakshmi	RTBI
59	V.Padma Priya	RTBI
60	Lakshmi.V	RTBI

10. Media Release/Links

- http://www.hindu.com/2010/07/07/stories/2010070760600200.htm
- http://expressbuzz.com/cities/chennai/detecting-disease-mobile-way/187956.html
- http://timesofindia.indiatimes.com/City/Chennai/New-tech-to-keep-tab-on-diseases/articleshow/6140485.cms
- http://www.financialexpress.com/news/New-mobile-technology-can-cut-biosurveillance-cost-by-50-/656589/
- http://srini.me/

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Thank you