User Requirement Specifications for the Information Communication Technology System of the Real-Time Biosurveillance Program: Pilot Project

Prepared for the Project Technology Partners

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By

Authors: Nuwan Waidyanatha[1], Roshan Hewapathirana[2], Geetha G. [3], and Pubudini Weerakoon[4]

[1] LIRNEasia, Kunming, China, waidyanatha@lirne.net, tele: +86 13888446352
[2] Post Graduate Institute of Medicine, Colombo University, Colombo, Sri Lanka, roshanhewapathirana@gmail.com, tele: +94 714900669
[3] Indian Institute of Technology – Madras's Rural Technology and Business Incubator, Cennai, India, gitu@tenet.res.in , tele: +91 9841413468
[4] Sarvodaya Shramadana Society, Kuliyapitiya, Sri Lanka, danushka.weerakoon@gmail.com , tele: +94 776270875

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1. INTRODUCTION

The Real-Time Biosurveillance Program[1] (RTBP) is an m-Health pilot project aiming to answer the question: "Can software programs that analyze health statistics and mobile phone applications that collect and report health information potentially be effective in the early detection, intervention, and prevention of disease outbreaks?" This project is a pilot aiming to study the technology, human, and policy predicaments in introducing the RTBP to Sri Lanka and India.

The objective of this document is to consolidate the business analysis of the disease surveillance and notification systems in both Sri Lanka and India and derive the user requirements specifications for University of Alberta, University of Colombo School of Computing Lanka Software Foundation, Carnegie Mellon University's Auton Lab, and Indian Institute of Technology – Madras's Rural Technology and Business Incubator (RTBI) to use as a guideline to develop the Software Requirement Specifications and go forth with the adaptation, design and development of standards, database, mobile applications, and analytics software programs.

The document is structured in a way to, First, give a brief overview of both Sri Lanka and India's healthcare system organizational structure and current practice for monitoring, detection, and reporting of diseases in the respective countries with a discussion of the inputs, outputs, and processes of the two individual systems. Second, discuss the expected inputs and outputs of the m-Health ICT system for gathering health information, analyzing, and reporting confined to the domain of disease surveillance and notification. Additional background information is provided in the Appendix for a comprehensive understanding of the details.

[1] A synopsis of the RTBP including the research proposal can be found here - http://lirneasia.net/projects/2008-2010/evaluating-a-real-time-biosurveillance-program/. You may also search for other articles related to this project by searching on the key words: m-Health, e-Health, disease, surveillance, biosurveillance, alerting, epidemiology,

2. PRESENT DAY DISEASE SURVEILLANCE AND REPORTING

2.1 SRI LANKA

2.1.1. Overview of the government epidemiological system

History of disease surveillance in Sri Lanka dates back to late 19th century. The *Quarantine and Prevention of Disease Ordinance* has been introduced in 1890 to implement the notification system on communicable disease in the country.

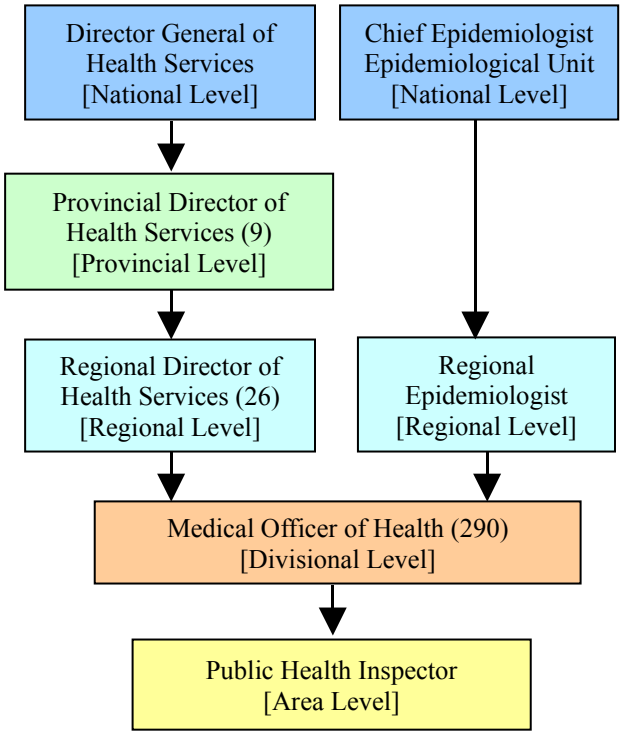


Figure 1 Organizational structure of the Sri Lanka Government Healthcare Officials; integer in parenthesis is the number of each entity in the country

Table 1 Government health organizational structure actors with their roles and responsibilities

Actor	***Role and Responsibilities***
Director General of Health Services (DGHS)	Policy & decision
Provincial Director of Health Services (PDGS)	Policy & decision
Regional Director of Health Services (RDHS)	Policy & decision making
Chief Epidemiologist (CE)	Analysis of the surveillance data; Policy & decision; Action plans for each situations; Preparation of WER and other reports
Regional Epidemiologist (RE)	Regional level decision making Mediate surveillances

Medical Officer of Health (MOH)	Key role in surveillance and notification; Reporting to the higher levels; Launching the actions prescribed by higher levels
Public Health Inspector (PHI)	Assisting in the reporting; Investigating the cases; Assisting the preventive and curative measures in field level

According to the Quarantine and Prevention of Disease Surveillance Ordinance, all medical practitioners or person professing to treat diseases and attending to patients (In government and private medical institutions – Intern House Officers, Grade Medical Officers, other Medical Officers and Consultants, General Practitioners, Family Physicians) suspected of any "notifiable" disease (see table 2) should notify the case to the relevant public health authorities.

Group A diseases should be notified to Director General of Health Services, Deputy Director General (Public Health Services), Epidemiologist, RE, Divisional Director of Health Services/Medical Officer of Health using form I (H-544).

Group B diseases should be notified to Divisional Director of Health Services/Medical Officer of Health using form I (H-544).

Severe Acute Respiratory Syndrome (SARS) should be notified to Director General of Health Services, Deputy Director General Public Health Services (PHS), Director/Quarantine, Air Port Health Officer, Port Health Officer, Epidemiologist, RE, Divisional Director of Health Services/Medical Officer of Health using form I (H-544).

Tuberculosis should be notified to Director/National Program for Tuberculosis, Tuberculosis Control and Chest Diseases using form II (H- 816).

Table 2: List of notifiable diseases in Sri Lanka and the notification mode

Disease	***Authority***	***Mode of notification***
Group A : Cholera, Plague, Yellow Fever	DGHS, DDG(PHS) Epidemiologist, RE,MOH	Telephone, Fax, Telegram, H-544
Group B: - AFP /Poliomyelitis - Enteric Fever - Tetanus - Chicken pox - Food Poisoning - Typhus Fever - DHF/DF - Human Rabies - Whooping cough - Diphtheria - Leptospirosis - Tuberculosis - Dysentery - Malaria - Viral Hepatitis - Encephalitis - Measles - Mumps - Rubella /CRS - Meningitis - Simple cont. Fever > 7 Days - Any other disease occurring in epidemic proportion		MOH by H-544
SARS/Suspected SARS	DGHS, DDG(PHC) Epidemiologist, RE,MOH Director Quarantine Airport/port health officer	Telephone, Fax, Telegram, H-544

Sri Lanka facility types: Teaching Hospital, Provincial General Hospital, District General Hospital, Base Hospital Type A, Base Hospital Type B, District Hospital, Peripheral Unit, Rural Hospital, Prison

Hospital, other Hospital (e.g. Police and Army Hospital), Special Campaign Hospital, Central Dispensary & Maternity Homes, Maternity Homes, and Central Dispensary. Table 3 specifies the facilities in Kurunegala District.

New policies are being implemented to rename these facilities. Table 3 introduces the new names of health facilities available in the Kurunegala district and brief descriptions of their services and roles. A more detailed description of the facilities and their services are in Appendix 7.

Table 3: Healthcare facilities governed by the MOH in Kurunegala District

Healthcare Provider	***Brief description***
Teaching/Provincial General Hospital	Teaching Hospitals are those hospitals where Professorial Wards are established and are engaged in under-graduate and/or post-graduate training. In provinces, which does not have a teaching Hospital will be developed with similar facilities. (Kurunagala is a Teaching Hospital)
District/Base Hospital	All existing District General Hospitals & Base Hospitals will be renamed as District Base Hospitals. Each District will have 1 District General Hospital & 1-2 District Base Hospitals to fulfill the needs of the population. Kuliyapitiya and Nikawaretiya have a district/base hospital each.
Divisional Hospital Type A, B, C	All District Hospitals, Rural Hospitals, and Peripheral Units will be re-named as Divisional Hospitals, irrespective of the number of beds. Type A – divisional hospitals with more than 100 patient beds, Type B – divisional hospitals with between 50-100 patient beds, and Type C divisional hospitals with Less than 50 patient beds
Primary Medical Care Units	Central dispensaries and maternity homes will be renamed as primary medical care units and shall provide - out patient care, limited emergency care: facilities for stabilization of patients before referring, to secondary or tertiary care medical institutions, facilities for a poly-clinic including Ante – Natal, Post – Natal, Family Planning, Child Health, Well Women
Suwadana Centers	There are over 450 Sarvodaya initiated Suwadana Centers that are functioning in the Island of which 53 are established in the Kurunerhala District. The centers are run by trained volunteers; namely the Suwadana Center Volunteers (abbreviated as Suwacevo). Suwadana Center activities - focal point for health education on an on-going basis, monitoring of health status of the community (community surveillance), liaison with government health services, first-aid and treatment of minor ailments, youth participation in health promotion, focal point for community disaster preparedness and management, organizing periodic health clinics for specific target groups, pre and post maternal care, small scale laboratory tests.

2.1.2.Disease surveillance and notification processes

Document flow and processes

The disease should be notified immediately at the time of first suspicion without waiting for laboratory test results or confirmatory tests. Making the notification at the earliest possible is of paramount importance thus enabling the field public health staff to start the necessary preventive and control

measures immediately.

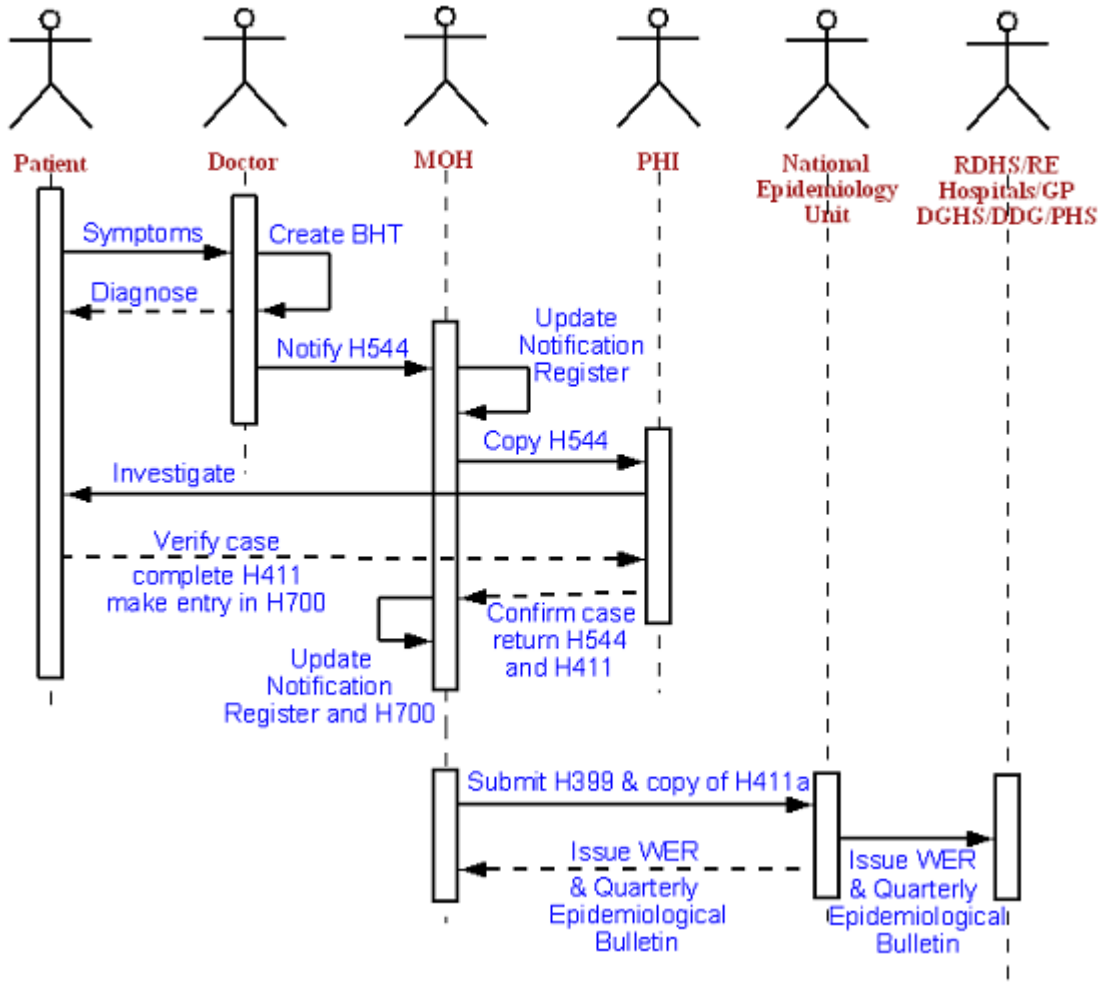


Figure 2 Sri Lanka system's sequence of disease notification and reporting

The notification card (Notification of a communicable disease – H-544) should be filled with especial emphasis on writing the patient's residential address (where it is suspected the patient contacted the disease) so that the range PHI can trace the residence easily. The notification card should be addressed and sent via post to the MOH of the area where the patient is residing in.

A medical officer notifying a case suspected with a notifiable disease should complete a *Notification of a Communicable Disease Form* (H-544). All such cases notified are entered in the *Ward Notification Register.* All wards should have Ward Notification Register. Correct name and address of the patient, age and sex of the patient, the disease suspected, the date of notification, to whom the case is referred to and special remarks are included in these ward notification registers.

The completed notifications should be sent to the Director/Medical Superintendent/ District Medical Officer of the institution daily where data are entered in an "Institutional Notification Register" and posted to the MOH of the relevant area.

The MOH on receipt of the Notification will enter the data in "Notification Register" of the MOH office and forward it to the relevant PHI in whose area the patient is a resident presumably contracted

the disease. The notification register contains the following data in a table format

1. Serial Number
2. Name of Patient
3. Address
4. Age
5. Sex
6. Disease
7. Date of Notification
8. Notified by whom
9. Date notification card received
10. PHI area
11. Date notification card sent to PHI
12. Date notification card received from PHI
13. Remarks

On receipt of H-544 the PHI enters the data in his letter inward register and will visit the household of the patient. During his visit he carries out a basic public health investigation into the reported case and confirms or refutes the disease. He also carries out necessary and relevant health education and preventive measures aimed at arresting any further cases and spreading of the disease. Then the PHI will complete the form H-411 (communicable disease report part 1) and enter the relevant data in his outward register. The data of all confirmed cases are also entered in the Infectious Diseases register (H-700) at the PHI office. The PHI will then return the completed H- 411 and H-544 to the MOH office.

At the MOH office on receiving the H-544 and H-411 forms from the PHI, the MOH updates the notification register and then enters data of confirmed cases in the Infectious Diseases register – H-700. For each confirmed case the form H-411a is completed using the data on the form H-411 sent by the PHI.

Every week the MOH completes the weekly return of communicable disease (WRCD– H-399) based on notification register and Infectious diseases register. The WRCD and H-411a forms for the particular week are sent to the Epidemiological Unit, Colombo with copy to the Regional Epidemiologist. A third copy should be retained in the MOH office for future reference. This is the most important activity of the MOH in the notification system for which he/she is personally responsible. The MOH has to fill in the WRCD and post it on Saturday, every week.

The MOH/DDHS is also responsible for updating the Maps and Charts in the office according to the instructions given in the divisional circular pub 110 of 1st November 1973.

For selected diseases which are under special surveillance the MOH has to complete the special investigation forms and send same to the Epidemiology Unit. Every week the Epidemiology Unit prepares a consolidated return of all WRCD. This Weekly Epidemiological Return (WER) is sent to all health institutions in the country including the MOH offices, thus completing the data flow cycle. WER contains the consolidated data on notifications by district, from all reporting 270 MOH areas of the country.

Table 4 Average time taken to complete each leg of the information flow

Functions in Figure 1	***Source***	***Sink***	***Duration (days)***
Create BHT	Patient	Doctor	1 (Immediate and continue till discharge)
Notify H-544	Doctor	MOH	7 (usually weekly)
Update Notification Register	MOH	MOH	1-2 (immediate)

Copy H-544	MOH	PHI	1 to 7 days
Investigate (visit patient to confirm syndrome)	PHI	Patient	1 – 10 days
Verify, complete H-411, make entry in H-700	Patient	PHI	1 to 3
Confirm case, return H-411 & H-544	PHI	MOH	1 to 2
Update Notification Register and H-700	MOH	MOH	1 to 2
Submit H-399 & Copy of H-411a	MOH	EPID Unit	1 -7 (urgent vs weekly)
Issue WER	EPID Unit	MOH	7 (weekly)
Issue WER	EPID Unit	RDHS, RE, Hospitals, GP, DGHS, DDG, PHI	7 – variable

2.1.3.Input and Output Documents

This section documents the attributes of the paper base inputs and outputs (forms) that are exchanged between the various healthcare officials for communicating disease information.

Table 5: H-544 from data entry Competed by General Practitioner/House officer/Senior Health Officer/ Consultant and sent to MOH

Document Name -->	Notification of a Communicable Disease (H-544)
Attribute Name	***Description of attributes***
Institute	Name of the institute notification is attached to
Name of Patient	Name of the patient
Name of the Guardian	If it is a pediatric patient
Disease	Tentative diagnosis
Date of Onset	The date patient noticed the ailment
Date of Admission	Date, patient was admitted to the institute
BHT number	Bed Head Ticket Number
Ward	Ward patient was referred to
Age	Age of patient
Sex	Sex of the patient (gender)
Laboratory results	Laboratory results pertaining to the disease (if any)
Home address	Home address of the patient
Telephone number	Phone number of the patient (if available)
Signature of Notifier	Signature of the doctor
Name	Name of the doctor
Status	General Practitioner/House officer/Senior Health Officer/Consultant
Date	data entry date

Table 6: H-411 form data entry completed by PHI and sent to MOH

Document Name -->	Communicable Disease Report – Part I (H-411)
Attribute Name	***Description of attributes***
PHI Reference no	
MOH notification no.	
MOH register no	
PHI range	PHI area
MOH/HO area	
Disease as notified	Disease notified /tentative diagnosis
Date	
Disease confirmed	Definitive diagnosis
Date	
Age	Age of the patient
Sex	Gender: Male/Female
Ethnic group S/T/M/B/Other	Sinhala/Tamil/Muslim/Burger/Other
Patient's movement during three weeks prior to onset	Patient's travel and contacts within last 3 weeks duration
Date of hospitalization	
Date of discharge	
Name of hospital	
Outcome Recovered/Died	Whether patient was recovered or deceased
Where isolated Home/Hospital/Not isolated	The place patient was kept during the period of isolation
Nature of case Isolated case	Behavior of the patient in isolation
Laboratory findings	Laboratory findings (if any)
Contacts investigated	Details of the contacts of the patient
Name	
Age	
Date seen	
Observation	

Patient's household	
Other contacts	

Table 7: H-411a form data entry completed by MOH/OIC sent to Director of Health Services, with WRCD

Document Name -->	Communicable Disease Report – Part II (H-411a)
Attribute Name	***Description of attributes***
RDHS division	Regional Director of health services division
MOH area	
MOH register no	
Age of patient	
Sex	Gender: Male/Female
Occupation	Ayurvedic physician/ estate superintendent/ other
Source of Notification 1-9	
Specify	
Disease as notified	
Disease as confirmed	Hospital MO/ MOH/ Other Gov MO/ RMO/ Practitioner
Confirmed by 1-5	clinical only/ clinicaland epidemiological/ clinical and bacteriological/ clinical and serological/ clinical, bacteriological and serological/ clinical and direct microscopy
Nature of confirmation 1-6	
Date of onset	
Date of notification	
Date of confirmation	MOH/ OIC
Signature	

Table 8 Notification registry data entered and maintained by MOH

Document Name -->	Notification Register
Attribute Name	***Description of attributes***
Serial Number	
Name of Patient	
Address	Patient’s resident address

Age	Age of patient in years
Sex	Gender: Male/Female
Disease	
Date of Notification	Date H-544 was produced
Notified by whom	Name of GP/Hospital/Clinician who created the H-544
Date notification card received	
PHI area	
Date notification card sent to PHI	
Date notification card received from PHI	
Remarks	

Table 9: H-399 form data entry completed by MOH/OIC and sent to DHS, with Communicable Disease Report

Document Name -->	Weekly Return of Communicable Diseases (H-399) – Part I & II Part I – Cases Notified during the week
Attribute Name	***Description of attributes***
Province	
District	
RDHS Division	Regional Director of Health Services Division
MOH area	
Weekly ending	
PHI area	Space for up to 10 PHI areas
Internationally notifiable diseases	Cholera, Plague, Yellow Fever – counts
Acute Poliomyelitis/Acute flaccid paralysis	Counts
Chicken Pox	Counts (number of cases)
Dengue fever/Dengue haemorrhagic fever	Counts (number of cases)
Diptheria	Counts (number of cases)
Dysentry	Counts (number of cases)
Encephalitis	Counts (number of cases)

Enteric fever	Counts (number of cases)
Food poisoning	Counts (number of cases)
Rabies	Counts (number of cases)
Leptospirosis	Counts (number of cases)
Malaria	Counts (number of cases)
Measles	Counts (number of cases)
Meningitis	Counts (number of cases)
Mumps	Counts (number of cases)
Rubella	Counts (number of cases)
Congenital Rubella Syndrome	Counts (number of cases)
Simple continued fever	Counts (number of cases)
Tetanus	Counts (number of cases)
Neonatal tetanus	Counts (number of cases)
Typhus fever	Counts (number of cases)
Viral Hepatitis	Counts (number of cases)
Whooping cough	Counts (number of cases)
Tuberculosis	Counts (number of cases)
Total	weekly total of above counts of all the diseases from list above
Document Name -->	Part II – Weekly summary
new cases notified during the week	
cases notified earlier and await investigations at beginning of the week	
cases decided as untraceable during the week	
cases decided as belonging to other MOH areas during the week	
cases confirmed as a non-notifiable disease during the week	
cases confirmed as a notifiable disease during the week	

cases awaiting investigations at the end of the week	
Signature - MOH	
Date	

2.1.4.Strengths and weaknesses of current system

Strengths

- This provides us the basis for control and prevention of any disease which has a potential to become a threat to the health of the public
- National network covering whole island at all 290 MOH divisions
- Availability of technical experts at each levels
- Close monitoring and evaluation: WRCD screened for clarity, timeliness, and completeness at divisional, regional, and national levels
- Data collection at national level with inbuilt monitoring at divisional, district, and national levels
- Feedback (WER, Quarterly Bulletin)

Weaknesses

- No active Surveillance: Only Activated-passive and Passive Surveillance
- Timeliness is not very satisfactory, 70% of the WRDC is received within 10 days
- Lack of Laboratory Surveillance
- Limited to inward cases; minimum contribution from OPD / Private sector
- Requires quality review

2.2. INDIA

2.2.1. Overview

National Surveillance Program for Communicable Diseases (NSPCD) was initiated in 1998 as a pilot project under the hood of the National Institute for Communicable Diseases[2] (NICD), which is the body that supervises the districts and analyses the data for outbreaks in India. NICD was established on in 1963, to expand and reorganize the activities of the Malaria Institute of India (MII) which remained in existence under different names since its inception in 1909. The reorganized Institute was established to develop a national centre for teaching and research in various disciplines of epidemiology and control of communicable diseases. The Institute was envisaged to act as a centre par excellence for providing multi disciplinary and integrated expertise in the control of communicable disease. The Institute was also entrusted the task of developing reliable rapid economic epidemiological tools which could be effectively applied in the field for the control of communicable diseases. The experience from the pilot is subsequently being expanded to build the Integrated Disease Surveillance Program (ISDP) for India.

NSPCD has been launched to strengthen the disease surveillance system so that early warning signals are recognized and appropriate timely follow-up action is initiated. The main objective of the program is capacity building at district and state levels. "WHO is in the process of computerizing the surveillance system in the states of Tamil Nadu and Maharashtra. Computers have been provided to the districts and the relevant staff trained in computer applications vis-à-vis surveillance. This will result in faster transmission of information in both directions and prompt action in the management of outbreaks."[3]

[2] A full description of the NIDC objectives are discussed here -- http://nicd.org/NICDObjectives.asp

[3] WHO instigated initiative can be found here -- http://www.whoindia.org/EN/Section3/Section108.htm

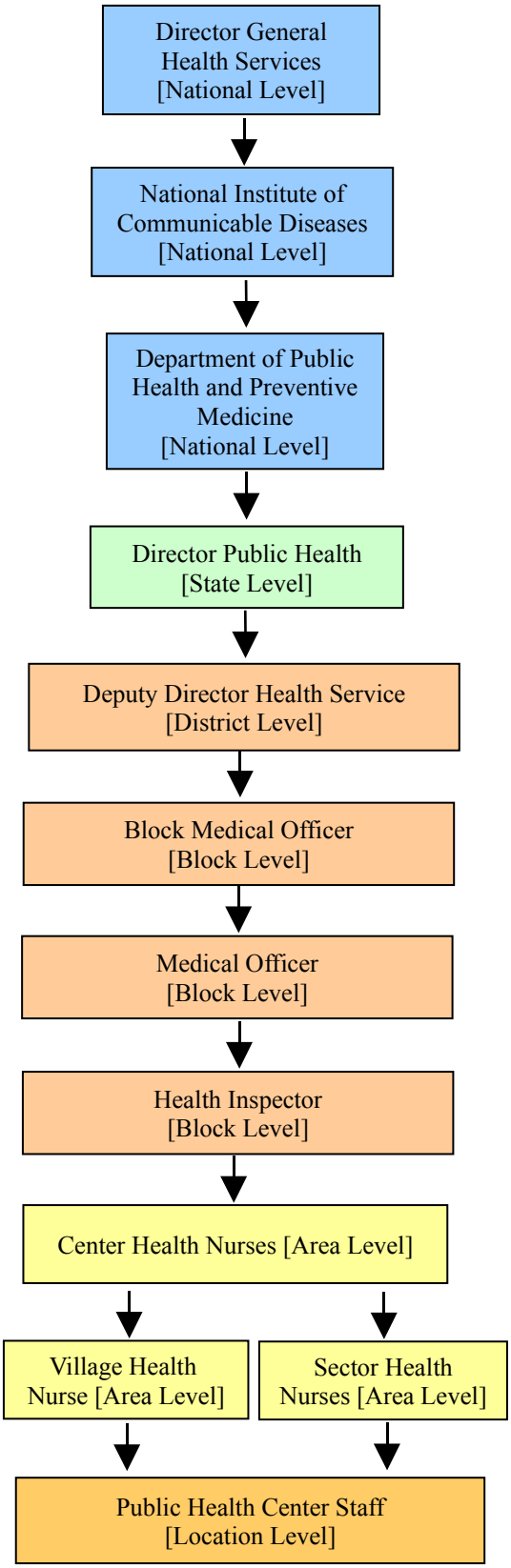


Figure 3: Organizational structure of the Indian Government Healthcare Officials

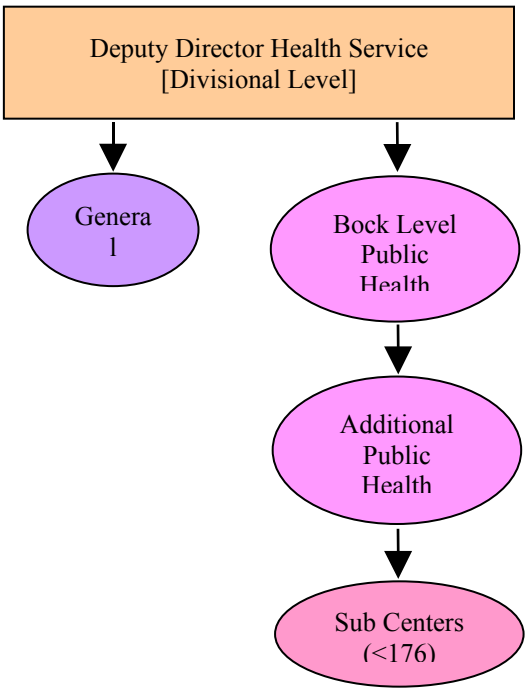


Figure 4: Organizational structure of the Indian Government Healthcare Facilities

Table 10: Government health system actors with their roles and responsibilities

Actor	***Role and Responsibilities***
Department of Public Health and Preventive Medicine	Implements of various National and State Health programs. This Department also plans and implements measures to prevent the occurrence of communicable diseases thereby reducing the burden of morbidity mortality and disability in the state. provisions of primary health care, which includes Maternity and Child Health Services, Immunization of children against vaccine preventable diseases, control of communicable diseases, control of malaria, filarial, Japanese encephalitis, elimination of leprosy, iodine deficiency disorder control program, prevention of food adulteration, health checkup of school children, health education of the community and collection of vital statistics under birth and death registration system and environmental sanitation. Prevention and control of waterborne diseases like Acute Diarrhea Diseases, Typhoid, Dysentery prevention and control of sexually transmitted diseases including HIV / AIDS.
Deputy Director Health Service (DDHS)	The DDHS does the ground work and takes immediate action if necessary, but always keeps the NICD updated on the statistics with periodic reports and seeks help whenever necessary.
Block Medical Officer (BMO)	A lead medical officer who can be consulted at several PHC facilities. This medical officer oversees the PHC medical officers.
Medical Officer (MO)	Each PHC has at least one Medical Doctor who are mostly fresh graduates working as interns.
Health Inspector (HI)	HI who is part of the DDHS assists the VHN in various activities such as conducting school health camps.
Center Health Nurse (CHN)	
Sector Health Nurse (SHN)	The SHN report to the DDHS
Village Health Nurse (VHN)	VHNs report to the DDHS - Any alert with high priority, the VHN will immediately bring it to the notice of the PHC and then health inspector, again after the analysis, the flow will reverse through the Medical officers, CHN, SHN, and ultimate implementation by the VHN.

Table 11: Healthcare facilities governed by the DDHS in Thirupathur Block

Healthcare Provider	***Description***
Block level Public Health Center (B-PHC)	There are 12 Block PHC; Scans are usually done at block PHC. each block PHC has 3 – 4 Additional PHC; On an average 5 – 7 deliveries are done per month
Additional Public Health Center (A-PHC)	44 Additional PHC; each additional PHC has 3-4 sub centers (SC). Besides the block level PHC in Chembanur there is an additional PHC, which has been functional since last 6 years. This PHC has 2 doctors, 3 staff nurses, 1 ANM, 1 pharmacist, 1 Health Worker and 1 Sanitary Worker. The usual conditions observed were upper respiratory tract infections, old age and immunizations. The referral hospital is a GH at Karriakudi. In general, A-PHC conducts tests

	for hemoglobin, blood sugar, albumin and HIV/AIDS.
Sub Center (SC)	Doctors are required to make field visit to the SCs, provided there is vehicle allocated.

2.2.2.Rural health data communication processes

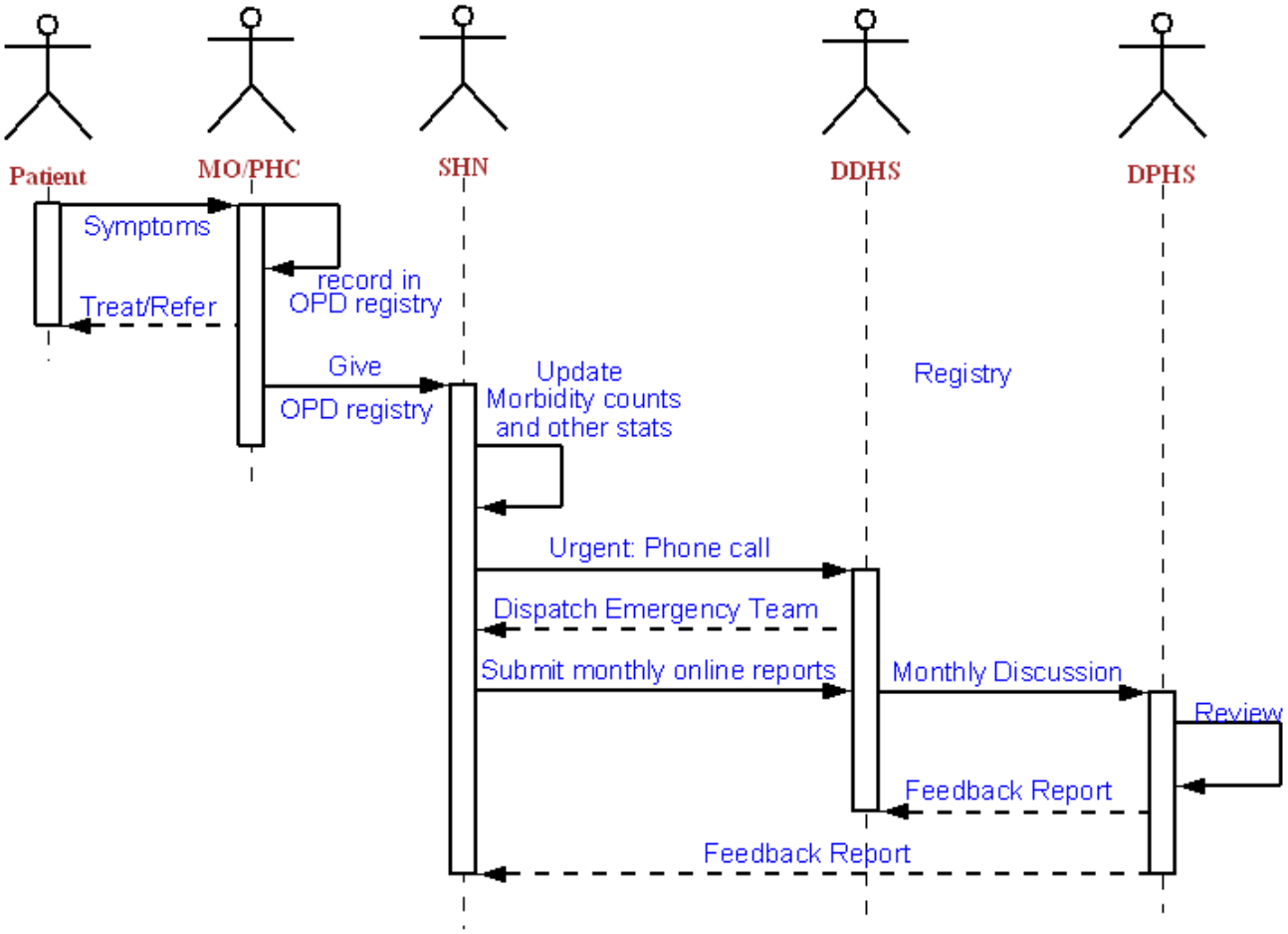


Figure 5: General State level notification process

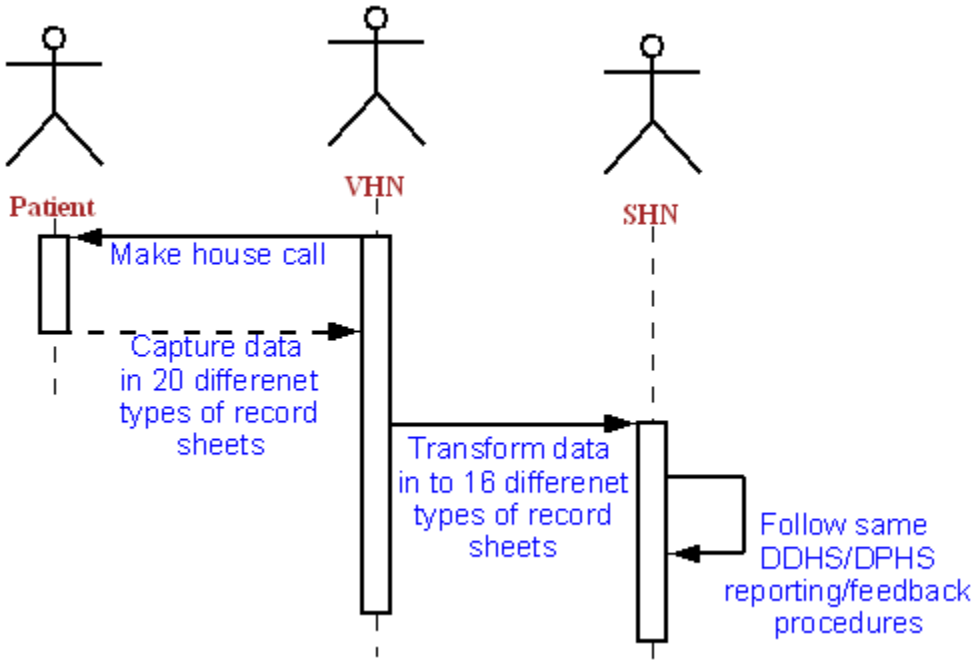


Figure 6: Village health nurse capture of village data

The various reports are - Family Welfare, Morbidity (currently done online), Acute Direct Diseases*, Fever*, Immunization Report (by phone), Deliveries, Minor Surgeries and Institution Report. Almost all of them are done by paper and fax except for Morbidity which was recently launched online.

If a cluster of common symptoms are observed, the PHC notifies its Health Inspector and VHN who in turn does a Survey in the concerned villages. A communicable disease verified by a Government VHN, SHN is informed to the DDHS designated to the area. The DDHS communicates the case to the DPHS designated to the state of Tamil Nadu. The information is then entered in to a computerized database, which is shared with the NICD.

Table 12: Average time taken to complete each leg of the information flow

Functions in Figure 5	***Source***	***Sink***	***Duration (days)***
Record in OPD registry	Doctor	OPD Registry	Immediate
Give OPD registry	OPD Registry	SHN	1
Update morbidity counts and other stats	SHN	Reports	7
Urgent: Phone call	SHN	DDHS	Immediate
Dispatch emergency team	DDHS	Block	Immediate
Submit monthly online report	SHN	DDHS	30
Monthly discussion	DDHS	DPHS	30
Review	DPHS	DPHS	30
Feedback reports	DPHS	DDHS	30
	DPHS	SHN	30
Functions in Figure 6	***Source***	***Sink***	***Duration (days)***
Make house call	Doctor	Doctor	7
Capture data	Doctor	PHC	7

Transform data	PHC	PHC	15
Follow functions in figure 5 on feedback	PHC	VHN/SHN/DDHS	30

2.2.3.Inputs and Outputs

Table 13 Public Health Center morbidity report entry input attributes

Document Name -->	PHC Morbidity Report Entry (on the web)
Attribute Name	***Description of attributes***
Name of the PHC	A drop down list to select the PHC name
Report Date	Date object to select the date
PHC OP Abstract	Enter the counts for PHC outpatients by Male, Female for Adults, Children, and Total
1. Respiratory System	
Bronchial Asthma	PHC OP Morbidity separated by Male Female for Adults, Children, and Total
COPD	PHC OP Morbidity separated by Male Female for Adults, Children, and Total
Allergic Bronchitis	PHC OP Morbidity separated by Male Female for Adults, Children, and Total
LRI including Pneumonia	PHC OP Morbidity separated by Male Female for Adults, Children, and Total
URI	PHC OP Morbidity separated by Male Female for Adults, Children, and Total
Tuberculosis	PHC OP Morbidity separated by Male Female for Adults, Children, and Total
Other respiratory disease	PHC OP Morbidity separated by Male Female for Adults, Children, and Total
2. Cardiovascular system	
Congenital Heart Disease	PHC OP Morbidity separated by Male Female for Adults, Children, and Total
Rheumatic Heart Disease	PHC OP Morbidity separated by Male Female for Adults, Children, and Total
	PHC OP Morbidity separated by Male Female for Adults, Children, and Total
Hypertension	PHC OP Morbidity separated by Male Female for Adults, Children, and Total
Ischemia including LI	PHC OP Morbidity separated by Male Female for Adults, Children, and Total
Other diseases related cardiovascular	PHC OP Morbidity separated by Male Female for Adults, Children, and Total
3. Pyrexia related diseases	
PUO	PHC OP Morbidity separated by Male Female for Adults, Children, and Total
Viral Fever	PHC OP Morbidity separated by Male Female for Adults, Children, and Total
Typhoid Fever	PHC OP Morbidity separated by Male Female for Adults, Children, and Total
Measles	PHC OP Morbidity separated by Male Female for Adults, Children, and Total

Chicken Pox	PHC OP Morbidity separated by Male Female for Adults, Children, and Total
Malaria	PHC OP Morbidity separated by Male Female for Adults, Children, and Total
Others	PHC OP Morbidity separated by Male Female for Adults, Children, and Total
4. Connective Tissue Disorder	
Osteo Arthritis	PHC OP Morbidity separated by Male Female for Adults, Children, and Total
Rheumatoid Arthritis	PHC OP Morbidity separated by Male Female for Adults, Children, and Total
Other connective tissue disorders	PHC OP Morbidity separated by Male Female for Adults, Children, and Total
5. Pregnancy related disorders	
Pregnancy induced hypertension	PHC OP Morbidity separated by Male Female for Adults, Children, and Total
Gestation Diabetes Mellitus	PHC OP Morbidity separated by Male Female for Adults, Children, and Total
Malnutrition	PHC OP Morbidity separated by Male Female for Adults, Children, and Total
Anemia	PHC OP Morbidity separated by Male Female for Adults, Children, and Total
Other related disorders	PHC OP Morbidity separated by Male Female for Adults, Children, and Total
6. Skin	
Eczema	PHC OP Morbidity separated by Male Female for Adults, Children, and Total
Tine infection	PHC OP Morbidity separated by Male Female for Adults, Children, and Total
Scabies	PHC OP Morbidity separated by Male Female for Adults, Children, and Total
Leprosy	PHC OP Morbidity separated by Male Female for Adults, Children, and Total
Other related skin diseases	PHC OP Morbidity separated by Male Female for Adults, Children, and Total
7. Insect/Animal Bite	
Dog bite	PHC OP Morbidity separated by Male Female for Adults, Children, and Total
Scorpion bite	PHC OP Morbidity separated by Male Female for Adults, Children, and Total
Snake bite	PHC OP Morbidity separated by Male Female for Adults, Children, and Total
Other insect and animal bites	PHC OP Morbidity separated by Male Female for Adults, Children, and Total
8. Gastro Intestinal System	
Acute diarrhoeal disease	PHC OP Morbidity separated by Male Female for Adults, Children, and Total
Abdominal colic	PHC OP Morbidity separated by Male Female for Adults, Children, and Total
Jaundice	PHC OP Morbidity separated by Male Female for Adults, Children, and Total
Worm infection	PHC OP Morbidity separated by Male Female for Adults, Children, and Total
Amoebasis	PHC OP Morbidity separated by Male Female for Adults, Children, and Total

Acid peptic disease	PHC OP Morbidity separated by Male Female for Adults, Children, and Total
Food poisoning	PHC OP Morbidity separated by Male Female for Adults, Children, and Total
Apthus ulcer	PHC OP Morbidity separated by Male Female for Adults, Children, and Total
Other related GIT system	PHC OP Morbidity separated by Male Female for Adults, Children, and Total
9. Genito urinary system	
Urinary tract infection	PHC OP Morbidity separated by Male Female for Adults, Children, and Total
Menstrual disorder	PHC OP Morbidity separated by Male Female for Adults, Children, and Total
RTI	PHC OP Morbidity separated by Male Female for Adults, Children, and Total
Malignancy	PHC OP Morbidity separated by Male Female for Adults, Children, and Total
Other related diseases including nephritic disease	PHC OP Morbidity separated by Male Female for Adults, Children, and Total
10. Neurological disorder	
Epilepsy	PHC OP Morbidity separated by Male Female for Adults, Children, and Total
CVA	PHC OP Morbidity separated by Male Female for Adults, Children, and Total
Meningitis	PHC OP Morbidity separated by Male Female for Adults, Children, and Total
Other neurological disorders	PHC OP Morbidity separated by Male Female for Adults, Children, and Total
11. ENT	
Sinusitis	PHC OP Morbidity separated by Male Female for Adults, Children, and Total
ASOM CSOM-middle ear infections	PHC OP Morbidity separated by Male Female for Adults, Children, and Total
Hearing defect	PHC OP Morbidity separated by Male Female for Adults, Children, and Total
Foreign body ear	PHC OP Morbidity separated by Male Female for Adults, Children, and Total
Foreign body nose	PHC OP Morbidity separated by Male Female for Adults, Children, and Total
Others	PHC OP Morbidity separated by Male Female for Adults, Children, and Total
12. Dental	
Dental carries	PHC OP Morbidity separated by Male Female for Adults, Children, and Total
Dental flurosis	PHC OP Morbidity separated by Male Female for Adults, Children, and Total
Other dental problems	PHC OP Morbidity separated by Male Female for Adults, Children, and Total
Gingivitis	PHC OP Morbidity separated by Male Female for Adults, Children, and Total
13. Opthalmic	
Refractive errors	PHC OP Morbidity separated by Male Female for Adults, Children, and Total
Conjunctivitis	PHC OP Morbidity separated by Male Female for Adults, Children, and Total

Foreign body eye	PHC OP Morbidity separated by Male Female for Adults, Children, and Total
Styc	PHC OP Morbidity separated by Male Female for Adults, Children, and Total
Other related diseases	PHC OP Morbidity separated by Male Female for Adults, Children, and Total
Nutritional disorder	
Anaemia	PHC OP Morbidity separated by Male Female for Adults, Children, and Total
Vitamin A deficiency	PHC OP Morbidity separated by Male Female for Adults, Children, and Total
Vitamin B deficiency	PHC OP Morbidity separated by Male Female for Adults, Children, and Total
Malnutrition	PHC OP Morbidity separated by Male Female for Adults, Children, and Total
Other vitamin deficiencies	PHC OP Morbidity separated by Male Female for Adults, Children, and Total
15. Endocrine system	
Diabetes Mellitus	PHC OP Morbidity separated by Male Female for Adults, Children, and Total
Goitre	PHC OP Morbidity separated by Male Female for Adults, Children, and Total
Others	PHC OP Morbidity separated by Male Female for Adults, Children, and Total
16. All other causes	
Accidents and Injuries	PHC OP Morbidity separated by Male Female for Adults, Children, and Total
Burns	PHC OP Morbidity separated by Male Female for Adults, Children, and Total
Surgical related diseases	PHC OP Morbidity separated by Male Female for Adults, Children, and Total

2.2.4.Strengths and weaknesses of current system

3. USER REQUIREMENT SPECIFICATIONS

The user requirement derived in this section follow from the close analysis of the current disease surveillance and notification systems in both Sri Lanka and Indian, discussed in the previous sections. The two main weaknesses deduced from the business analysis are -

1) The existing system purely thrives on a set of known diseases, labeled as communicable and or notifiabe diseases and not on detecting emerging diseases or other adverse health events
2) The time taken in delivering the vital health information both upstream and downstream through paper, phone, and fax based system up and down the health system organizational structure is greater than 10 days

Therefore, the summary of the user requirements are –

1) design an system to detect all adverse events (including communicable diseases); thus, collect all patient health information for analysis in a timely manner
2) design a system that can directly communicate health information from the point of origin to the key decision makers at central levels with provision for the same information to be accessed by all actors at the in between stages in the health organizational structure to execute the required protocols

First we introduce the key actors, their roles, and the functionality required for the purpose of data collection, analysis, and reporting. Secondly, we introduce the minimal set of attributes required to attain the system requirements for collection of health data, analysis, and reporting.

3.1.Functions, Actors, and Roles of envisaged RTBP

In general the users are the healthcare workers, government or non governmental (private). Although the names (titles) assigned to the healthcare workers for the purpose of disease surveillance and notification is different between Sri Lanka and India the roles and responsibilities are quite similar. Table 9 describes the set of functions, actors and their roles/responsibilities. The columns labeled 'Expected' under both Sri Lankan actors and Indian actors are the healthcare workers entrusted to carryout the prescribed function (protocols) and would be the resource persons expected to carryout the respective functions, namely, the government health officials. The column labeled "Actual" indicates the resource person who will be actually carrying out the respective function for the purpose of the pilot project.

Table 14 RTBP ICT system functions, actors, and roles/responsibilities

Function	***Sri Lankan Actors***		***Indian Actors***		***Roles and Responsibilities***
	Expected	*Actual*	*Expected*	*Actual*	
Data submission	PHI	Suwacevo	VHN/SHN	VHN/SHN	Gather diagnosis, symptom, signs, gender, and age group records with respect to in and out patient visitations from the healthcare providers (hospitals, clinics, PHCs, GPs, community health centers, etc) in their jurisdiction.
Analysis	RE/CE	RA	NICD	DDHS/NI	Periodically examine datasets

				CD	from the central repository for a given time period with the use of software tools for manually or automatically detecting adverse events.
Decision Making	MOH, RE, CE	MOH	PHC, DDHS, DPHS, NICD	PHC, DDHS, DPHS, NICD	When an adverse event such as a possible disease outbreak or unusually increase of similar cases is detected through the analysis process a Decision Maker must decide whether or not the event is of significance to be communicated downstream to designated healthcare workers in the vulnerable geographical areas
Publishing -issue reports/alerts	RE or CE	RA	PHC, VHN, HI-DDHS	RA	There are three types of reports: low, high, and urgent priority reports/alerts. *Low* and *High* priority reports are generated and disseminated on a weekly (or periodic) basis identifying substantially significant events (e.g. WER). Recipient healthcare workers are not expected to take immediate action but closely monitor those diseases if they are of relevance. *Urgent* priority alerts are issued as and when a disease outbreak is detected and the healthcare workers in the vulnerable areas must be notified to take immediate action.
Subscribing - receive reports/alerts	MOH, RDHS, RE, Hospitals, GP, DGHS, DDG, and PHI	Suwacevo and MOH	VHN, PHC, HI-DDHS, CHN, SHN	VHN, PHC, HI-DDHS, CHN, SHN	Subscribers can choose to receive either Urgent, High or Low priority alerts. Based on the individual's responsibilities and the priority level of the alert the recipients will chose the course of action to be taken. If it is a low priority alert they may chose to be vigilant and observe and if it is a high priority alert the individual may chose to apply intervention and prevention actions to safeguard their respective communities

3.2. Anticipated problems

- Suwacevo will be playing the role of the PHIs. However, the Suwasevo don't have the same level of training as the PHIs who under go 3-4 year of training in healthcare associated with their work.
- Although all forms carry all 3 local languages, the Sri Lankan healthcare system functions in English. The Suwacevo will not have the same level of English language competency as the PHIs, at least, not the domain specific language
- VHNs and SHNs are to be entrusted in submitting the disease and syndrome data. However, VHNs and SHNs are informed only if the PHC detect a cluster of common symptoms. Ideally we would want the VHNs and SHNs to submit all symptoms. How they are to receive or extract information pertaining to all the symptoms reported by patients, is a question.
- Research Assistants (RAs) will be conducting the automated and manual analysis. It is doubtful that they will have the same level of experience as an acute physician or epidemiologist to detect adverse events that are not quite obvious.

3.3. Optimal set of Inputs, Outputs, and functionality of ICT system

The partners or teams designing and developing the necessary standards, software, and protocols are expected to use the tables below as a guide to developing the precise specification, which will be documented in the SRS. It is evident that the designers and developers will need to expand on this and introduce more attributes and relationships to build the working solutions.

3.3.1. Gathering of Diagnosis and Syndrome data

The Suwacevo and VHN will be providing a minimal set of information, listed in Table 10, for the purpose of analysis and detection of adverse health events. The Suwacevo or VHN will visit the healthcare providers, periodically, or use other means to retrieve in and out patient data from the registries (e.g. BHT) to digitize and send those records to a central database. The Suwacevo and VHN should be able to record the relevant data in digital form in a minimal allotted time such as at a rate of 05 seconds per record, which would amount to roughly 25 minutes to enter and submit 250 records.

Table 15 attributes of visitation data collection from the providers by the Suwacevo and VHN

Attribute	***Description***	***Example***
Sender ID	[Single Value]: A unique identifier to associate the data with the healthcare worker (VHN or Suwacevo) submitting the data	1) Health system assigned unique ID 2) Name + National ID number 3) National ID Number
Provider	[Single value]: Healthcare provider: hospital, clinic, GP, community healthcare center, etc, where the data will be collected from. This element will help identify location (or source) of the health record. It is anticipated that the patient will be from	1) provider name: Kurnegala Base Hospital, provider type: Hospital, provider town/village: Kurunegala 2) provider name: Sivaganga Maternity Hospital, provider type: Hospital; provider town/village:

	the near by area. It is possible that a patient from outside of the area mat visit the provider	Wariyapola 3) provider name: Asiri Community Healthcare Center, provider type: clinic; provider town/village: Pannala
Diagnosis	[Single value]: Name of the disease the practitioner concludes (diagnoses) based on the patient's symptoms and signs	Dengue, Diarrhea, Parkinson's
Symptoms	[Multiple values]: The complaints made by the patient to the doctor. The same diagnosis for two different patients may not always accompany the same symptoms	1) fever, joint aches, vomit blood, rash (Dengue) 2) fever, joint ache (Dengue) 3) bloody stools (Diarrhea)
Signs	[Multiple values] : The observations made by the practitioner (doctor)	Swelling, Rash, Enlarged retinal, Discoloration of tongue
Gender	[Single value]: Male, Female, or Unknown	
Age Group	[Single value]: Age categories; it at the discretion of the implementers as to how they wish to define the age categories	1) Adult / Child 2) 0 – 10, 11 – 20, …, 91 – 100, 3) Infant (0 – 1), Child (2 – 12), Teenager (13 – 19), Youth (20 – 25), Adult (26 – 50), Elder (50 – 100)
No. of Cases	[Single Value]: In a particular reporting period more than one patient may share the same diagnosis, symptoms, and signs and be of the same gender and age group. In the event an aggregate can be reported instead of having to repeat the record	1) Default value = 1 2) General value = any "Natural" number
Date	[Single Value]: The date the patients or the cases were recorded by the provider; i.e. visitation date or admitted date	

3.3.2.Relations database for storing gathered data

The relation database must have a record of the attributes defined in Table 11. The table structure will contain more attributes than described in Table 11 as well as related data and preserve data integrity. The data gathered (health records of patient diagnosis and syndrome) by the healthcare workers from the provider will be stored in this database. The same data will be made available for the purpose of analysis.

Table 16 Information stored in the database

Attribute	***Description***	***Example***
Provider	Same as in Table 10	
Diagnosis	Same as in Table 10; can be null. The database will try to resolve (suggest) a diagnosis based on the received symptoms	
Symptoms	Same as in Table 10; cannot be null	
Signs	Same as in Table 10; can be null	

Gender	Same as in Table 10. If the input value is NULL then will default to "Unknown"	
Age Group	Same as in Table 10; cannot be null	
No. of Cases	Same as in Table 10; can be null, if null then will default to 1	
Date	Same as in Table 10; can be null	
ICD-10	[Single value]: International Code for Diseases version 10; the database will resolve the value based on the relationship of the codes associated with the diagnosis (disease). The healthcare workers will not be required to submit this data but the internal processes will fill in the voids.	A01.0 Typoid fever A90 – Dengue Fever B01 – Varicella (chickenpox) none - some diseases are not classified. So 'none' should be a valid option
Long/Lat	[Two values]: GIS longitude and latitude will be resolved by the database by looking up the values from the pre registered GIS location information of the provider village/ town or other location identifier.	1) Lon = 8.1414 Lat = 3.4123
Other	[Multiple values]: other attributes the user can set or processes the user can execute to detect adverse events	1) Spatial Scan 2) WSARE 3) Tipmon

3.3.3.Analysis for detection of events

Periodically, daily, every-other-day, or weekly, the RA (or Epidemiologist) will analyze the data for a given time frame to monitor and detect any emerging health threats. They may also execute other detection algorithms or processes for detection of possible adverse events. The users (detection and monitoring staff) will need to filter the dataset through various combinations of selected parameters identified in Table 12.

Table 17 Analysis done by RAs (or Epidemiologists) of the collected datasets

Attributes	***Description***	***Examples***
Period	[Two values]: Start and End date of the series of data to be analyzed. Neither value can be null. Some logic will be used to suggest the start and dates for a period	1) 11-Oct-2006 to 10-Oct-2007 2) 01-Mar-2008 to 31-Mar-2008
Disease (Diagnosis)	[Multiple value]: Same as in Table 10; user should have the option of selecting a single disease for analysis or a collection of disease to analyze the dataset	1) Parkinson's 2) Dengue, Malaria, (mosquito born diseases) 3) Typhoid, Rubella, Jaundice (Child diseases)
Symptoms	[Multiple value]: Same as in Table 10; user should have the option of selecting a single symptom or a collection of symptoms to analyze the data	1) Cough 2) Fever, Cough 3) Fever, Joint Ache, Rash
Gender	[Multiple value]: Same as in Table 10; user should have the option of selecting Male or	1) Male 2) Male, Unknown

	Female, Unknown or a subset of the genders such as Male and Unknown to analyze the dataset	3) Male, Female, Unknown
Age group	[Multiple value]: Same as in Table 10; user should have the option of selecting one or a range of age groups	1) Child 2) All (Child & Adult) 3) Age: 10 – 25
Provider	[Multiple value]: Same as in Table 10; user should have the option of selecting one or a collection of providers.	1) Kurunegala base hospital 2) Kurunegala base hospital, Kuliyapitiya hospital, Pannala Peripheral Unit
Area	[Multiple values]: user should have the option of selecting a polygon (i.e. GIS area). The locations will be subdivided as Country, Region, State, Province, District, Division, Area, Town/Village	1) Pannal MOH Division 2) Kurunegala District 3) Sivaganga District 4) Tamil Nadu State
Other	[Multiple values]: other attributes the user can set or processes the user can execute to detect adverse events	1) Spatial Scan 2) WSARE 3) Tipmon

3.3.4.Alerting and reporting of emerging disease outbreaks

Required attributes to generate weekly disease surveillance reports such as the WER and issuing alerts of potential threats such as emerging disease outbreaks. The RA (or epidemiologist) will extract a summary of the weekly report (e.g. WER) and send the report to the healthcare workers each week. In the event of detecting a significant health threat the resources associated with detection and monitoring (e.g. RA or Epidemiology Unit staff) will notify the decision makers (e.g. MOH or CE) of the potential threat. Thereafter, the decision maker will decide the priority level and authorize the detection and monitoring staff to issue a bulletin (alert) to those health officials in the vulnerable areas. The weekly reports are regarded as low or high priority bulletins (reports) and the immediate notifications (alerts) are regarded as urgent priority bulletins.

Table 18 Weekly reports and urgent alerts issued by RA (Epidemiologist) to all healthcare workers

Attributes	***Description***	***Examples***
Headline	[Single values]: A head line describing one or more significant event(s)	1) "Rains increase mosquito born diseases" 2) "Chinkengunya appears in North Central province" 3) "Unusual fever like disease emerging among children"
Priority	[Single value]: indicating the urgency, severity, and certainty of the emerging disease with priority levels: high – healthcare worker should access alternate resources to learn more about the emerging disease and be vigilant, perhaps inform community, low – healthcare worker should be vigilant but does not need to take any	1) low 2) high 3) urgent

	action, or urgent – if message is intended for the healthcare worker (i.e. affects area healthcare worker is in) then take immediate intervention and prevention actions	
Area	[Multiple values]: to identify the geographical areas the significant event has emerged in or is affecting	1) Western and Central Provinces 2) Sivaganga, Colombo, Kurunegala Districts 3) Pannal, Wariyapola Divisions 4) Kuliyapitiya, Nathandiya, Pannala, Towns 5) Sri Lanka
Description	[Single values]: Table of, at most, top 5 diseases and their counts or the most significant urgent priority adverse event and a description of the incident.	1) Dengue (23), Malaria (15), Flue (145), 2) Chikengunya (12) 3) "be advised, 12 cases of Chikengunya identified in Sivaganga district, rapidly spreading, take immediate action"
Resources	[Multiple values]: http link to website with full report for users to access to obtain further information and instructions	1) http://www.epid.gov.lk/WER/ 2) http://www.sahana.lk/DS/GIS/WER 3) IVR: +9198555123123 4) Deputy Director Health Services: +914455599889988

3.4.Description of associated system attributes

This section defines the set of attributes associated with the data elements and database

Table 19 Sample of Diagnosis (diseases), symptoms, and signs

Diagnosis (Disease)	***Symptoms***	***Signs***
Cholera	Watery Diarrhea, Nausea, Vomiting, Muscle ramps, Thirst	Dehydration, Tachycardia, Drowsiness
Plague	Fever with Chills, Headache, Fatigue, Diarrhea, Chest pain, Vomiting, Muscle aches, Cough with blood stained sputum	Buboes, Bleeding from mucosal tissues, Gangrenes, Pneumonia, Coma
Yellow Fever	Fever, Headache, Muscle aches, Nausea, Loss of appetite, Dizziness, Abdominal pain	Red eyes, Red tongue, Yellowing of skin, Yellowing of sclera, Bleeding from nose, Heart arrhythmias, Liver failure, Kidney failure, Delirium, Seizures, Coma
Polio Myelitis / Acute Flaccid Paralysis	Fever, Headache, Vomiting, Diarrhea, Fatigue, Constipation, Difficult to swallow, Difficulty in breathing	Neck stiffness, Back stiffness, Muscle spasms, Increase sensitivity to touch, Paralysis of the limbs, Cranial Nerve palsy, Facial muscle paralysis, Features of bulbar palsy
Diphtheria	Sore throat, Painful swallowing,	Hoarseness, Swollen glands, Grey

	Difficulty in breathing, Fever, Chills, Malaise	membrane covering throat, Red infected wound, Wound with gray patchy material, Eye signs
Dysentery	Abdominal cramp, Nausea, Vomiting, Fever, Diarrhea, Blood stained stools, Mucous stained stools	Abdominal tenderness
Pertussis	Runny nose, Sneezing, Mild cough, Low-grade fever, Dry cough	Whooping
Enteric Fever	Fever, Headache, Fatigue, Sore throat, Abdominal pain, Diarrhea, Constipation	Rash, High fever, Distended abdomen, Delirium, Typhoid state

Table 20 Attributes associated with the Healthcare Provider identification

Provider Attribute	***Description***	***Example***
Name	Registered name of the healthcare provider or facility	Asiri hospital, Pannala Community Health Center, Dr. Roshan Hewapathirana, MD Chennai Family Clinic
Type	The type of the healthcare provider defined by the country's healthcare system	Hospital, Clinic, Community Health Center, Maternity Home, General Practitioner
State/Province 1)	State or Province within the country the provider operates in or is licensed to operate	Tamil Nadu, Rajasthan, Western Central
District 1)	District within the State or Province the provider operates in or is licensed to operate	Sivaganga, Kurunegala, Kandy
Village/Town 1)	Village or town within the District the provider operates in or is licensed to operate	Kuilyapitiya, Kurunegala, Pannala
Street Address	Postal street address the provider operates in or the facility is established	12 Colombo road, 42-12 Kiribathhena road
GIS coordinates 1)	GIS Long & Lat coordinates of the location of the provider facility	Long: 10.1234 Lat:7.0987 Long: 34.1234 Lat: 23.1122

Table 21 Geographical coverage definitions with hierarchy

Parent	***Child***	***Examples of Parent***
Country	Province, State	Sri Lanka, India
Province	District	Western, Sabaragamuwa, Central
State	District	Tamil Nadu, Rajasthan, Maharashtra
District	Division, Block	Kurunegala, Sivaganaga
Block	--	Thirupathur
Division	Area	Pannala, Kuliyapitiya, Wariyapola, Udubeddewa
Area	--	PHI area, VHN area

4. GLOSSARY OF ACRONYMS AND TERMS

ANM	
BHT	Bed Head Ticket
DDHS	Deputy Director of Health Services
DGHS	Director General of Health Services
ICT	Information Communication Technology
MOH	Medical Officer of Health
NIDC	National Institute for Disease Control
PHC	Public Health Center
PHI	Public Health Inspector
PHS	Public Health Services
RTBP	Real-Time Biosurveillane Program
SARS	Sevier Acute Respiratory Syndrome
SHN	Sector Health Nurse
SRS	Software Requirement Specification
Suwacevo	Suwadana Center Volunteers
URS	User Requirement Specification
VHN	Village Health Nurse
WER	Weekly Epidemiological Report
WRCD	Weekly Return of Communicable Diseases

5. APPENDIX A – Inventory of Health Facilities

5.1. Kurunegala District, Sri Lanka

Table 22 Kurunegala district, Sri Lanka health facility inventory

Facility Type	***Facility Name***
Provincial General Hospital	TH-Kurunegala (Line Ministry Inst.)
Base Hospital Type A	BH-Kuliyapitiya
Base Hospital Type B	BH-Nikaweratiya, DH-Polpitigama, DH-Galgamuwa
District Hospital	DH-Alawwa, DH-Dambadeniya, DH-Maho, DH-Mawathagama, DH-Polgahawela, DH-Ridigama, DH-Sandalankawa, DH-Wariyapola, DH-Hettipola, DH-Hiripitiya, DH-Gokarella, DH-Bingiriya, DH-Katupotha, DH-Narammala
Preripheral Unit	PU-Ambanpola, PU-Dunakadeniya, PU-Kandanegedara, PU-Mahagiriella, PU-Mahananneriya, PU-Megalewa, PU-Muwanhela, PU-Nikawewa, PU-Pahalagiribawa, PU-Thalampitiya, PU-Kotawehera, PU-Kobeigane, Rural Hospital, RH-Ehetuwewa, RH-Delwita, RH-Gonigoda, RH-Mahamukalanyaya, RH-Wellawa, RH-Koshena, RH-Karambe, RH-Indulgodakanda, RH-Nawatalwatta, RH-Rajanganaya,
Central Dispensary & Maternity Homes	CM-Munamaldeniya, CM-Madahapola, CM-Rasanayakepura (Pahala Mawathagama)
Central Dispensary	CD-Boraluwewa, CD-Buluwala, CD-Dodangaslanda, CD-Divurunpola, CD-Diganpitiya, CD-Elabadagama, CD-Gonawa, CD-Hiruwalpola, CD-Bihalpola, CD-Bopitiya, CD-Batalagoda, CD-Balalla, CD-Bandara koswatte, CD-Udumulla, CD-Mothuwagoda, CD-Netiya, CD-Welikare, CD-Ataragalle, CD-Divullegoda, CD-Uhumeeya, CD-Dothalla, CD-Kadigawa, CD-Horathapola, CD-Kudagalgamuwa, CD-Minuwangette, CD-Tisogama, CD-Taranauduwela, CD-Talawa-Moragollagama, CD-Kalugalle, CD-Udubaddawa, CD-Kimbulwanaoya, CD-Weerapokuna, CD-Weuda, CD-Usgala Siyambalagomuwa, CD-Kattimahana, , CD-Wadakada, CD-Kosdeniya, CD-Kumbukwewa, CD-Inguruwatte, CD-Makulpota, CD-Ethanawatta, CD-Potuhera, CD-Boyawalana, CD-Nagollagama, CD-Narangoda, CD-Melsiripura, CD-Kolambagama, CD-Maspotha, CD-Wewagama, CD-Udapolawatta, CD-Thambarombuwa, CD-Gonagama

5.2. Kurunegala District, Sri Lanka

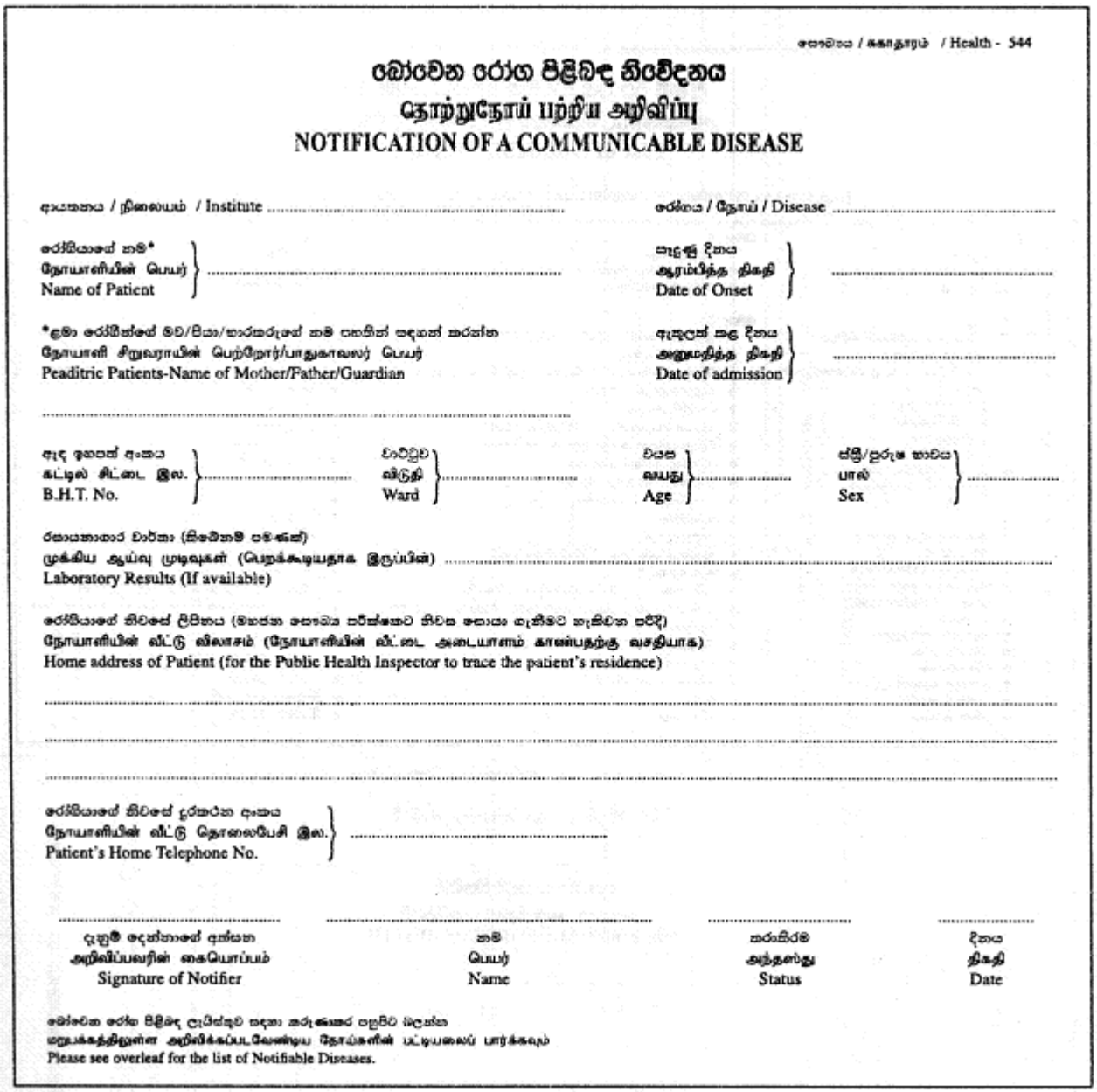
Table 23 Kurunegala district, Sri Lanka health facility inventory

Facility Type	***Facility Name***
Provincial General Hospital	TH-Kurunegala (Line Ministry Inst.)
Base Hospital Type A	BH-Kuliyapitiya

Base Hospital Type B	BH-Nikaweratiya, DH-Polpitigama, DH-Galgamuwa
District Hospital	DH-Alawwa, DH-Dambadeniya, DH-Maho, DH-Mawathagama, DH-Polgahawela, DH-Ridigama, DH-Sandalankawa, DH-Wariyapola, DH-Hettipola, DH-Hiripitiya, DH-Gokarella, DH-Bingiriya, DH-Katupotha, DH-Narammala
Preripheral Unit	PU-Ambanpola, PU-Dunakadeniya, PU-Kandanegedara, PU-Mahagiriella, PU-Mahananneriya, PU-Megalewa, PU-Muwanhela, PU-Nikawewa, PU-Pahalagiribawa, PU-Thalampitiya, PU-Kotawehera, PU-Kobeigane, Rural Hospital, RH-Ehetuwewa, RH-Delwita, RH-Gonigoda, RH-Mahamukalanyaya, RH-Wellawa, RH-Koshena, RH-Karambe, RH-Indulgodakanda, RH-Nawatalwatta, RH-Rajanganaya,
Central Dispensary & Maternity Homes	CM-Munamaldeniya, CM-Madahapola, CM-Rasanayakepura (Pahala Mawathagama)
Central Dispensary	CD-Boraluwewa, CD-Buluwala, CD-Dodangaslanda, CD-Divurunpola, CD-Diganpitiya, CD-Elabadagama, CD-Gonawa, CD-Hiruwalpola, CD-Bihalpola, CD-Bopitiya, CD-Batalagoda, CD-Balalla, CD-Bandara koswatte, CD-Udumulla, CD-Mothuwagoda, CD-Netiya, CD-Welikare, CD-Ataragalle, CD-Divullegoda, CD-Uhumeeya, CD-Dothalla, CD-Kadigawa, CD-Horathapola, CD-Kudagalgamuwa, CD-Minuwangette, CD-Tisogama, CD-Taranauduwela, CD-Talawa-Moragollagama, CD-Kalugalle, CD-Udubaddawa, CD-Kimbulwanaoya, CD-Weerapokuna, CD-Weuda, CD-Usgala Siyambalagomuwa, CD-Kattimahana, , CD-Wadakada, CD-Kosdeniya, CD-Kumbukwewa, CD-Inguruwatte, CD-Makulpota, CD-Ethanawatta, CD-Potuhera, CD-Boyawalana, CD-Nagollagama, CD-Narangoda, CD-Melsiripura, CD-Kolambagama, CD-Maspotha, CD-Wewagama, CD-Udapolawatta, CD-Thambarombuwa, CD-Gonagama

6. APPENDIX A – Disease surveillance and notification documents

6.1.SRI LANKA disease communication paper documents



සෞඛ්‍යය / சுகாதாரம் / Health - 544

බෝවෙන රෝග පිළිබඳ නිවේදනය

தோற்றுநோய் பற்றிய அறிவிப்பு

NOTIFICATION OF A COMMUNICABLE DISEASE

ආයතනය / நிலையம் / Institute .....

රෝගය / நோய் / Disease .....

රෝගියාගේ නම*
நோயாளியின் பெயர்
Name of Patient .....

පැතිරුණු දිනය
ஆரம்பித்த திகதி
Date of Onset .....

*ළමා රෝගීන්ගේ මව/පියා/භාරකරුගේ නම පහතින් සඳහන් කරන්න
நோயாளி சிறுவராயின் பெற்றோர்/பாதுகாவலர் பெயர்
Peaditric Patients-Name of Mother/Father/Guardian

ඇතුලත් කළ දිනය
அனுமதித்த திகதி
Date of admission .....

.....

ඇද ඉගෙන් අංකය
கட்டில் சிட்டை இல.
B.H.T. No. .....

වාට්ටුව
வீடுதி
Ward .....

වයස
வயது
Age .....

ස්ත්‍රී/පුරුෂ භාවය
பால்
Sex .....

රසායනාගාර වාර්තා (තිබෙනම පමණක්)
முக்கிய ஆய்வு முடிவுகள் (பெறக்கூடியதாக இருப்பின்) .....
Laboratory Results (If available)

රෝගියාගේ නිවසේ ලිපිනය (මහජන සෞඛ්‍ය පරීක්ෂකට නිවස සොයා ගැනීමට හැකිවන පරිදි)
நோயாளியின் வீட்டு விலாசம் (நோயாளியின் வீட்டை அடையாளம் காண்பதற்கு வசதியாக)
Home address of Patient (for the Public Health Inspector to trace the patient's residence)

.....

.....

.....

රෝගියාගේ නිවසේ දුරකථන අංකය
நோயாளியின் வீட்டு தொலைபேசி இல.
Patient's Home Telephone No. .....

දැනුම් දෙන්නාගේ අත්සන
அறிவிப்பவரின் கையொப்பம்
Signature of Notifier .....

නම
பெயர்
Name .....

තරාතිරම
அந்தஸ்து
Status .....

දිනය
திகதி
Date .....

මෙම රෝග පිළිබඳ ලැයිස්තුව කරුණාකර පසුපිට බලන්න
மறுபக்கத்திலுள்ள அறிவிக்கப்படவேண்டிய நோய்களின் பட்டியலைப் பார்க்கவும்
Please see overleaf for the list of Notifiable Diseases.

Figure 7 H-544 Form for communicating disease from MOH to PHI (Sri Lanka)

බෝවන රෝග පිළිබඳ සතිපතා වාර්තාව / வாராந்த தொற்று நோய் அறிக்கை / WEEKLY RETURN OF COMMUNICABLE DISEASES

සෞඛ්‍ය දෙපාර්තමේන්තුව / சுகாதார சேவைகள் திணைக்களம் / DEPARTMENT OF HEALTH SERVICES

සෞඛ්‍ය / சுகாதாரம் / Health } H 399

Province: ....

Part I – Cases notified during the week

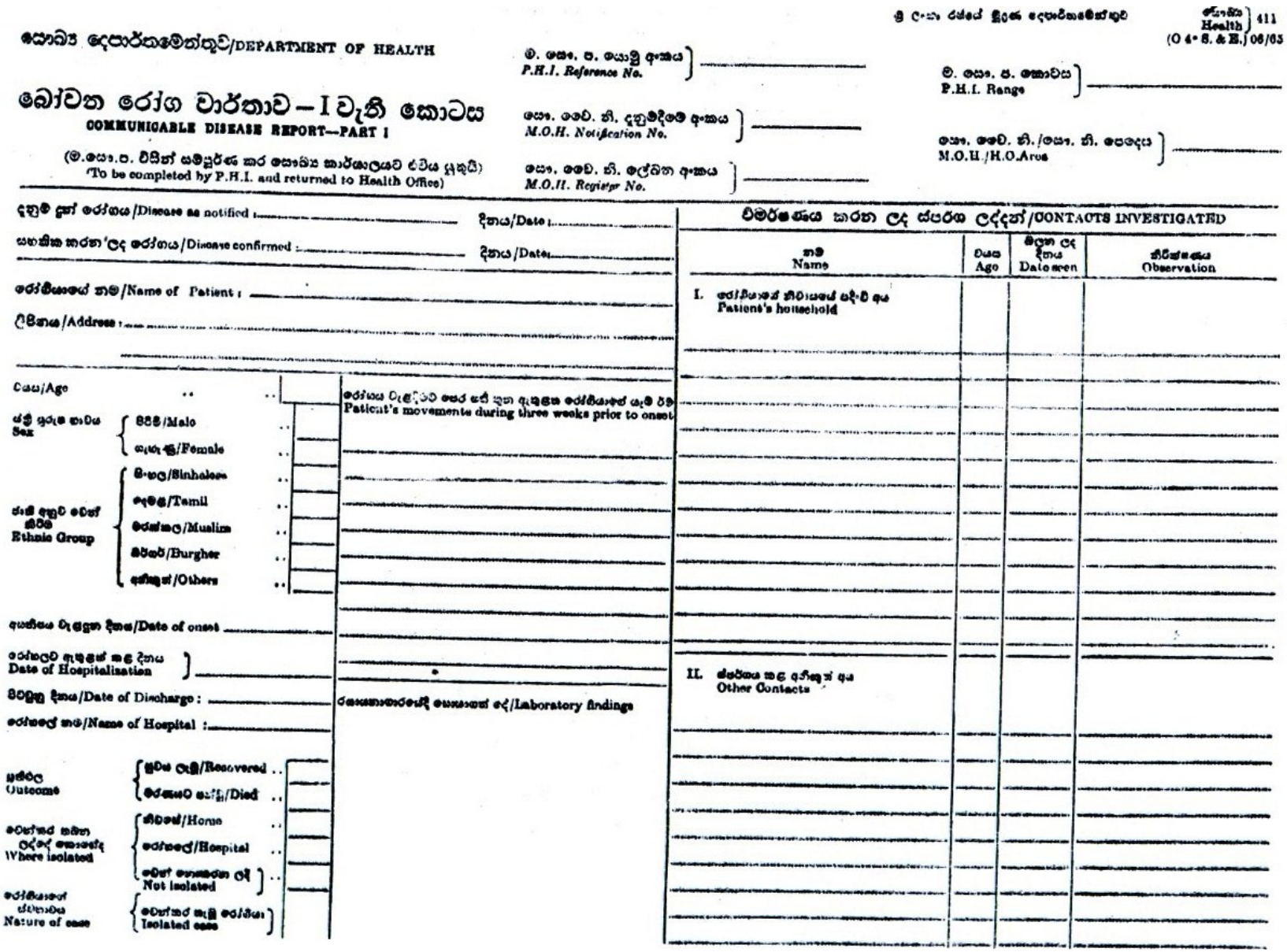
District: .... M.O.H. Area: ....

R.D.H.S. Div. .... Week ending: ....

PHI area	Internationally Notifiable Diseases (Cholera, Plague, Yellow Fever)	Acute Poliomyelitis / Acute Flaccid Paralysis	Chicken Pox	Dengue Fever / Dengue Heamorrhagic Fever	Diphteria	Dysentery	Encephalitis	Enteric Fever	Food Poisoning	Human Rabies	Leptospirosis	Malaria	Measles	Meningitis	Mumps	Rubella	Congenital Rubella Syndrome	Simple Contd. Fever	Tetanus	Neonatal Tetanus	Typhus Fever	Viral Hepatitis	Whooping Cough	Tuberculosis
Total																								
Part II – Weekly Summary																								
1. New cases notified during the week																								
2. Cases notified earlier and awaiting investigation at begining of the week																								
3. Cases decided as untraceable during the week																								
4. Cases decided as belonging to other MOH areas during the week																								
5. Cases confirmed as a non-notifiable disease during the week																								
6. Cases confirmed as a notifiable disease during the week																								
7. Cases awaiting investigation at the end of the week																								

Signature of M.O.H. .... Date ....

Figure 8 H-399 Form for communicating diseases by MOH to the national and regional levels (Sri Lanka)



සෞඛ්‍ය දෙපාර්තමේන්තුව/DEPARTMENT OF HEALTH

ශ්‍රී ලංකා රජයේ මුද්‍රණ දෙපාර්තමේන්තුව

Health 411
(O 4* S. & E.) 06/65

බෝවන රෝග වාර්තාව – I වැනි කොටස
COMMUNICABLE DISEASE REPORT—PART I

(මු.සෞ.ප. විසින් සම්පූර්ණ කර සෞඛ්‍ය කාර්යාලයට එවිය යුතුයි)
(To be completed by P.H.I. and returned to Health Office)

මු. සෞ. ප. යොමු අංකය / P.H.I. Reference No.

මු. සෞ. ප. කොට්ඨාසය / P.H.I. Range

සෞ. වෛ. නි. දැනුම්දීමේ අංකය / M.O.H. Notification No.

සෞ. වෛ. නි./සෞ. නි. පෙදෙස / M.O.H./H.O.Area

සෞ. වෛ. නි. ලේඛිත අංකය / M.O.H. Register No.

දැනුම් දුන් රෝගය/Disease as notified : ..... දිනය/Date :

සහතික කරන ලද රෝගය/Disease confirmed : ..... දිනය/Date :

රෝගියාගේ නම/Name of Patient : .....

ලිපිනය/Address : .....

වයස/Age ..

ලිංගික භාවය Sex — පිරිමි/Male .. ; ගැහැණු/Female ..

ජාති අනුව වෙන් කිරීම Ethnic Group — සිංහල/Sinhalese .. ; දෙමළ/Tamil .. ; මුස්ලිම්/Muslim .. ; බර්ගර්/Burgher .. ; අනිකුත්/Others ..

අසනීප වූ දිනය/Date of onset .....

රෝහලට ඇතුළත් කළ දිනය Date of Hospitalisation .....

පිටවූ දිනය/Date of Discharge : .....

රෝහලේ නම/Name of Hospital : .....

ප්‍රතිඵල Outcome — සුවය ලැබූ/Recovered .. ; මරණයට පත්/Died ..

වෙන්කර තබන ලද්දේ කොහේද Where isolated — නිවසේ/Home .. ; රෝහලේ/Hospital .. ; වෙන් නොකරන ලදී/Not isolated ..

රෝගියාගේ ස්වභාවය Nature of case — වෙන්කර තැබූ රෝගියා/Isolated case

රෝගය වැළඳීමට පෙර සති තුන ඇතුළත රෝගියාගේ යැම් ඊ Patient's movements during three weeks prior to onset

රසායනාගාරයේදී සොයාගත් දේ/Laboratory findings

විමර්ශනය කරන ලද සම්පර්ක ලද්දන්/CONTACTS INVESTIGATED

නම Name	වයස Age	බලන ලද දිනය Date seen	නිරීක්ෂණය Observation
I. රෝගියාගේ නිවසේ සිටි අය Patient's household			
II. නිවසින් පිට අනිකුත් අය Other Contacts			

Figure 9 H-411 form prepared by PHI and communicated to MOH (Sri Lanka)

සෞඛ්‍ය දෙපාර්තමේන්තුව
DEPARTMENT OF HEALTH

සෞඛ්‍ය 411 අ
Health 411a
(F* 4 S. & E.) 12/87

බෝවෙන රෝග වාර්තාව – II කොටස
COMMUNICABLE DISEASE REPORT PART II

(සතිපතා බෝවන රෝග වාර්තාව සමඟ සෞ. ලේ. අ. ව ඊරිය යුතුයි)
(To be sent with Weekly Return of Communicable Diseases to D. H. S.)

(1) සෞ. ලේ. අ. කොට්ඨාසය
R. D. H. S. Div.

(2) සෞ. වෛ. නි. කොට්ඨාසය
M.O.H. Area :

(3) සෞ. වෛ. නි. ලේ. අංකය
M.O.H. Register No :

(4) රෝගියාගේ වයස
Age of Patient :

(5) රැකියාව
Occupation

(6) ස්ත්‍රී/පුරුෂ භාවය
Sex of Patient :— Male 1
Female 2

(7) දැනුම් දුන් ස්ථානය—
Source of notification.—

ආරෝග්‍ය ශාලාව Hospital	1
බෙහෙත් හල Dispensary	2
ම. සෞ. ප P.H.I.	3
ග්‍රාමසේවක Grama Sevaka	4
පාසල්ගුරුවරයා School Teacher	5
පුද්ගලික පුහුණු වෛද්‍ය Private Practitioner	6
ආයුර්වේද වෛද්‍ය Ayurvedic Physician	7
වතු අධිකාරී Estate Superintendent	8
අනිකුත් Other	9

විස්තර කරන්න Specify

(8) රෝගය දැනුම් දුන් පරිදි
Disease as notified

(9) රෝගය ස්ථිර කළ පරිදි
Disease as confirmed

(10) ස්ථිර කළේ : ආරෝග්‍යශාලා වෛද්‍ය නිලධාරී Confirmed by : Hospital M.O. 1
සෞ. වෛ. නි. M. O. H. 2
අනිකුත් රජයේ වෛ.නි Other Govt. M. O. 3
ඇපෝතිකරී Apothecary 4
පුහුණු වෛද්‍ය Practitioner 5

(11) ස්ථිර කිරීමේ ස්වභාවය
Nature of confirmation—

ශාරීරික පමණක් Clinical only	1
ශාරීරික සහ වසංගත Clinical and Epidemiological	2
ශාරීරික සහ ක්ෂුද්‍ර Clinical and Bacteriological	3
ශාරීරික සහ මස්තු Clinical and Serological	4
ශාරීරික ක්ෂුද්‍ර සහ මස්තු Clinical, Bacteriological and Serological	5
ශාරීරික සහ සෘජු සූක්ෂ්ම දර්ශක Clinical and direct Microscopy	6

(12) රෝගය පටන් ගත් දිනය
Date of onset

(13) දැනුම් දුන් දිනය
Date of notification

(14) ස්ථිර කළ දිනය
Date of confirmation

අත්සන/සෙ.වෛ.නි/කා.භාරී/
Signature of M.O.H/O. I. C.

*කාර්යාලීය ප්‍රයෝජනය සඳහා පමණයි
*Office Use Only

පැහැදිය යුතුයි.—(1) 5, 7, 10, සහ 11 කරුණු අදාළ කොටුවේ × ඇසීමෙන් සම්පූර්ණ කළ යුතුයි. අනිකුත් කරුණු සඳහා ඇති ඉඩ ප්‍රමාණයෙහි සටහන් කළ යුතුයි. කාර්යාලීය ප්‍රයෝජන සඳහා වෙන් කර ඇති කොටුවේ කිසියම් සටහනක් නොකරන්න.

(2) 9 වැනි විෂය හැකි පමණ විස්තර සහිතව සම්පූර්ණ කළ යුතුය. උදා. "පැරා උණ සන්නිපාත උණ ඒ" —මිස " ආන්ත්‍රික උණ " නොවේ.

Notes.—(1) Items 5,7,10 and 11 should be completed by placing a × in the appropriate box. Other items should be entered in the space provided. Plese do not enter anything in space for office use.

(2) Items 9 should be completed in as much detail as possible, e.g., "Paratyphoid A" and NOT "Enteric fever".

ඒ 100793—100,000 (87/12) ශ්‍රී ලංකා රජයේ මුද්‍රණ දෙපාර්තමේන්තුව

Figure 10 H-411a form communicated by MOH to regional and national levels (Sri Lanka)

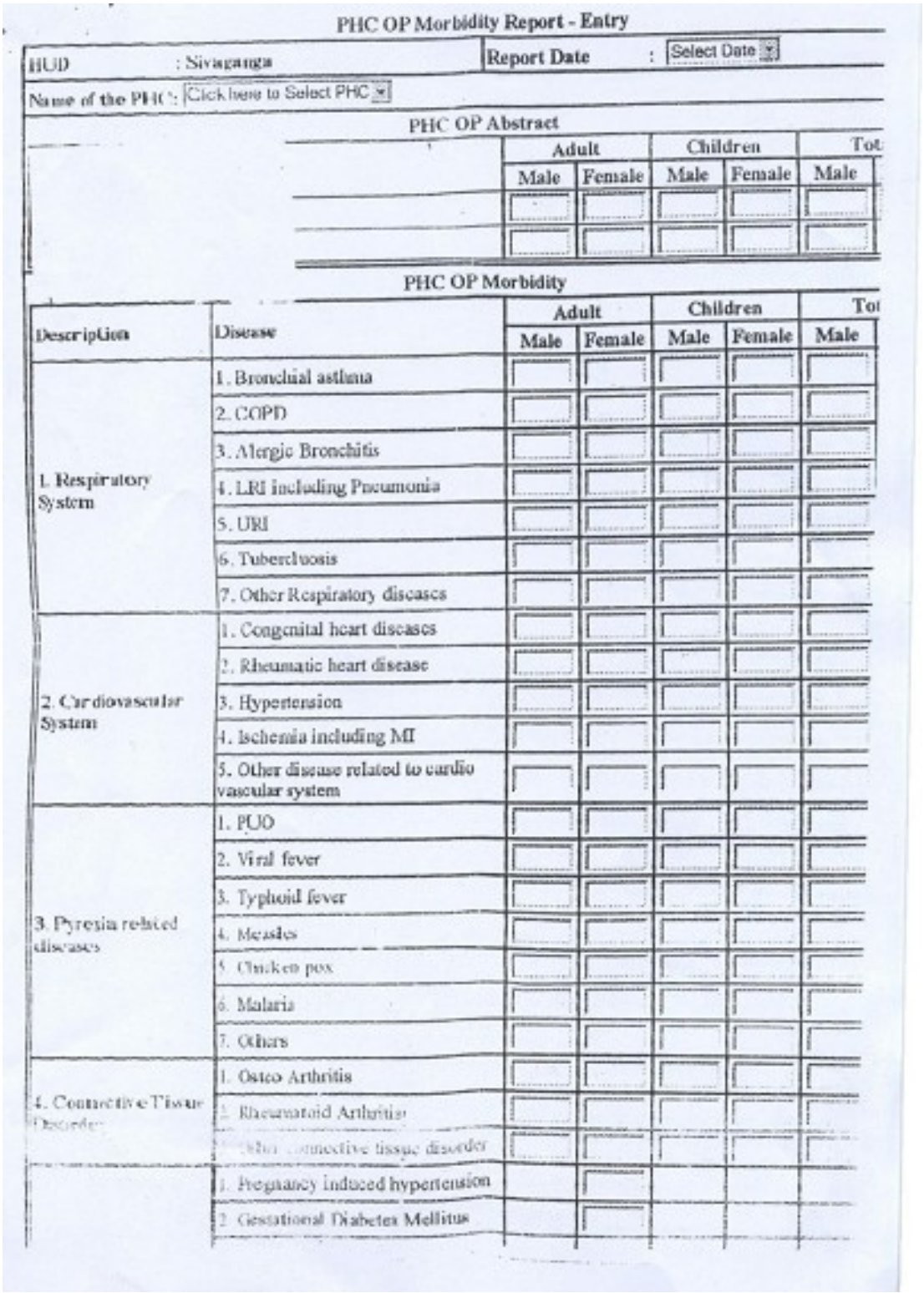
Table 4: Selected notifiable diseases reported by Medical Officers of Health

25th Nov - 1st Dec 2006 (48th Week)

DPDHS Division	Dengue Fever / DHF*		Dysentery		Encephalitis		Enteric Fever		Food Poisoning		Leptos-pirosis		Typhus Fever		Viral Hepatitis		Returns Re-ceived Timely**
	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	%
Colombo	86	3112	04	336	00	07	03	78	00	45	02	131	00	04	01	67	**86**
Gampaha	25	1673	03	300	00	10	00	57	00	147	03	200	00	11	05	143	**64**
Kalutara	11	886	11	472	00	07	00	77	00	59	07	114	00	06	02	44	**70**
Kandy	90	1265	04	425	00	09	03	112	01	35	07	90	02	96	00	129	**82**
Matale	16	325	09	297	00	06	00	18	00	21	03	26	00	02	03	19	**67**
Nuwara Eliya	02	37	04	331	00	00	02	182	00	18	00	11	00	38	14	251	**86**
Galle	06	218	06	182	00	03	00	13	00	12	07	59	01	16	00	04	**94**
Hambantota	04	210	01	93	00	09	01	32	00	32	02	49	00	83	01	57	**90**
Matara	15	494	03	176	00	10	03	75	00	34	07	155	08	225	02	14	**100**
Jaffna	00	48	00	134	00	03	00	158	00	27	00	03	00	129	00	75	**00**
Kilinochchi	00	01	00	23	00	00	00	06	00	24	00	00	00	00	00	08	**00**
Mannar	00	01	04	51	00	00	00	135	00	03	00	01	00	00	00	10	**40**
Vavuniya	02	12	20	140	00	04	00	91	07	79	00	02	00	00	00	08	**75**
Mullaitivu	00	02	01	24	00	01	00	36	00	09	00	00	00	00	01	10	**50**
Batticaloa	00	62	06	215	00	03	01	38	00	16	00	06	00	00	06	196	**50**
Ampara	00	27	00	209	00	00	00	12	00	00	00	10	00	03	00	17	**14**

Figure 11: Weekly Epidemiological Report (WER) published on the web by the Epidemiology Unit (Sri Lanka)

6.2.INDIA present disease communication web document



PHC OP Morbidity Report - Entry

HUD : Sivaganga | Report Date : Select Date

Name of the PHC : Click here to Select PHC

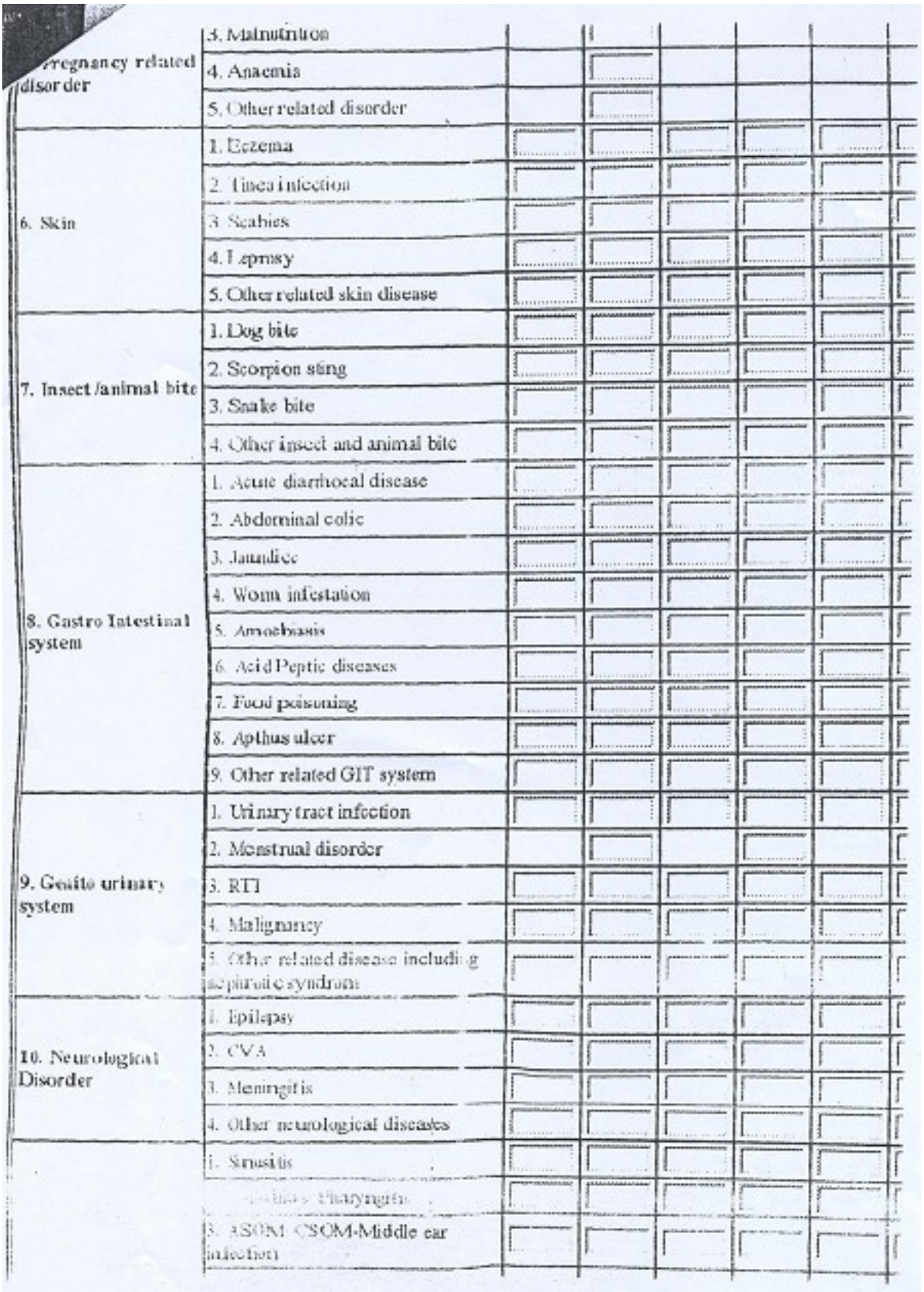
PHC OP Abstract

	Adult		Children		Tot
	Male	Female	Male	Female	Male

PHC OP Morbidity

Description	Disease	Adult		Children		Tot
		Male	Female	Male	Female	Male
1. Respiratory System	1. Bronchial asthma					
	2. COPD					
	3. Allergic Bronchitis					
	4. LRI including Pneumonia					
	5. URI					
	6. Tuberculosis					
	7. Other Respiratory diseases					
2. Cardiovascular System	1. Congenital heart diseases					
	2. Rheumatic heart disease					
	3. Hypertension					
	4. Ischemia including MI					
	5. Other disease related to cardio vascular system					
3. Pyrexia relsted diseases	1. PUO					
	2. Viral fever					
	3. Typhoid fever					
	4. Measles					
	5. Chicken pox					
	6. Malaria					
	7. Others					
4. Connective Tissue Disorder	1. Osteo Arthritis					
	2. Rheumatoid Arthritis					
	3. Other connective tissue disorder					
	1. Pregnancy Induced hypertension					
	2. Gestational Diabetes Mellitus					

Figure 12 PART I - Public Health Center Morbidity Report Entry report (entered through the web)



Pregnancy related disorder	3. Malnutrition						
	4. Anaemia						
	5. Other related disorder						
6. Skin	1. Eczema						
	2. Tinea infection						
	3. Scabies						
	4. Leprosy						
	5. Other related skin disease						
7. Insect /animal bite	1. Dog bite						
	2. Scorpion sting						
	3. Snake bite						
	4. Other insect and animal bite						
8. Gastro Intestinal system	1. Acute diarrhoeal disease						
	2. Abdominal colic						
	3. Jaundice						
	4. Worm infestation						
	5. Amoebiasis						
	6. Acid Peptic diseases						
	7. Food poisoning						
	8. Apthus ulcer						
	9. Other related GIT system						
9. Genito urinary system	1. Urinary tract infection						
	2. Menstrual disorder						
	3. RTI						
	4. Malignancy						
	5. Other related disease including nephrotic syndrom						
10. Neurological Disorder	1. Epilepsy						
	2. CVA						
	3. Meningitis						
	4. Other neurological diseases						
	1. Sinusitis						
	[illegible] Pharyngitis						
	3. ASOM CSOM-Middle ear infection						

Figure 13 PART II - Public Health Center Morbidity Report Entry report (entered through the web)

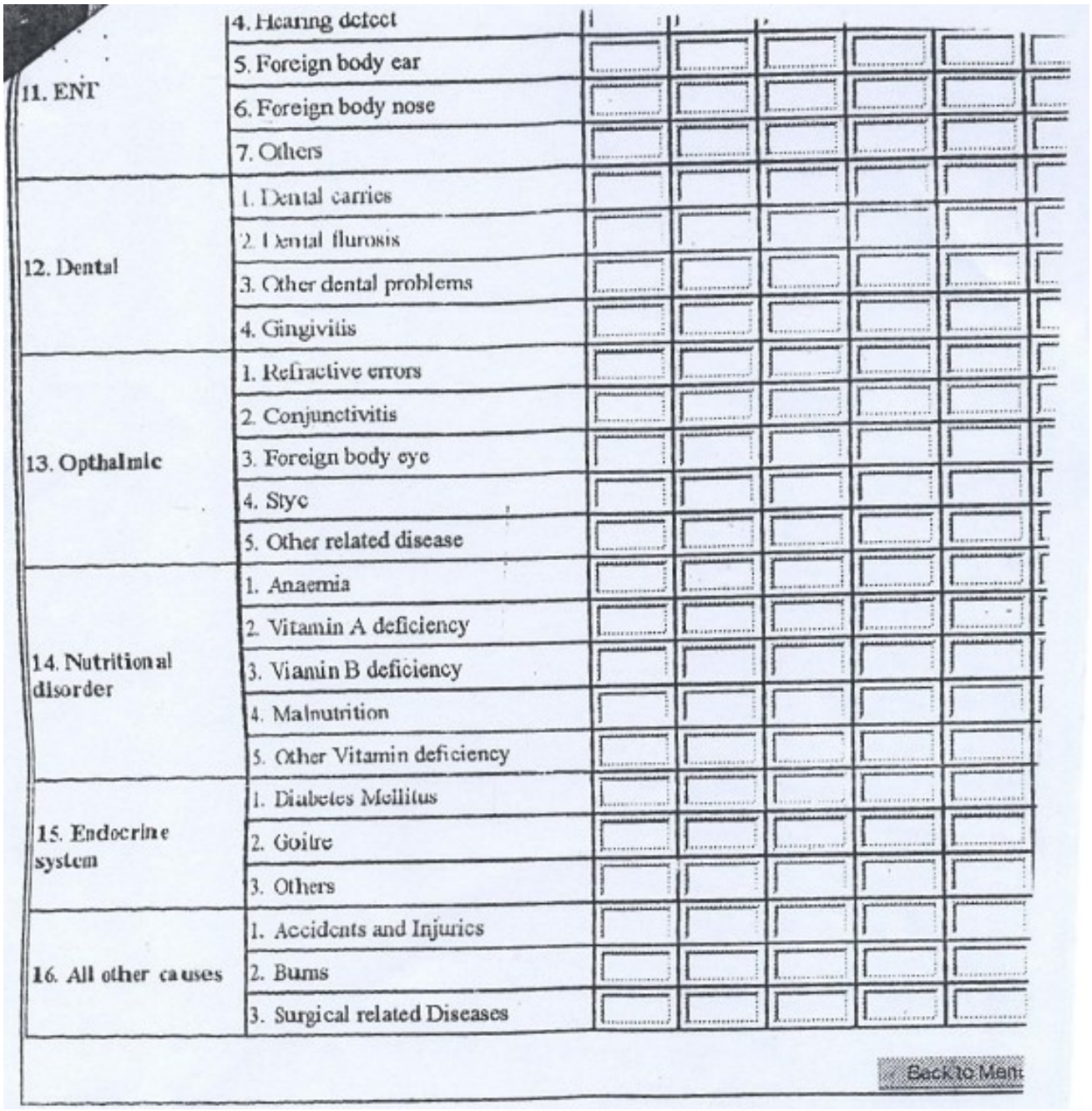


Figure 14 PART III - Public Health Center Morbidity Report Entry report (entered through the web)

7. APPENDIX X – The proposed hospital re-categorization

Pubudini Weerakoon,
Research Assistant
Real-Time Biosurveillacne Program
Kuliyapitiya, Sri Lanka

The network of Government Hospitals is primarily responsible for carrying out the curative health care delivery system. The range of hospitals includes sophisticated teaching hospitals to maternity homes and central dispensaries, which are scattered in the rural areas. Teaching hospitals, Base hospitals, District general Hospitals, District Hospitals, Peripheral units, Rural Hospitals, Maternity homes provide in-patient care facilities for over 95% of the patients who seek admission.

Keeping in line with the health policy of Sri Lanka it is essential that these hospitals be developed in order to ensure equity of health care delivery system. It has been stipulated in the National Health Policy developed in 1996 and the 1998 Presidential Task Force report on Health Policy Implementation that one District Hospital in every District will be upgraded in to a District General Hospital. Presently hospitals are selected for development when funds are available. Sometimes opinion based, unorganized hospital development has caused problems such as unavailability of Human Resources and logistical problems leading to under utilization of these developed hospitals.

The door to successful user-friendly hospital system hinges on evidence based, planned hospital development system. Therefore it is proposed that a comprehensive need based, bottom up, hospital development plan to be developed using a participatory approach. This concept paper described the detailed steps in developing a National Hospital Development Plan.

As the first phase of the activity it is proposed to re-categorize the hospitals into four categories, which will provide the foundation for decision making in the hospital developmental process. Once approved it is proposed to workout finer details, the infra structure, human resources, equipment, drugs and supplies, and other logistics which will enable hospitals to be developed in a uniform manner. This proposal explicitly describes the proposed re-categorization of hospitals.

7.1. The nomenclature of hospital to be changed

Teaching Hospital/Provincial Hospital (Kurunagala)

Teaching Hospitals are those hospitals where Professorial Wards are established and are engaged in under-graduate and/or post-graduate training. In provinces, which does not have a teaching Hospital will be developed with similar facilities. (Kurunagala is a Teaching Hospital)

List of Service offered:

1. Out Patient Department (OPD) with separate Preliminary Care Unit, Emergency Care Unit and Screening Facilities.

2. Clinic Facilities
3. In wards facilities

3 Medical units	1Neuro surgical unit
3 Surgical units	2Orthopaedic surgical unit
3 Gynecology ands Obstetric units	2ENT surgical unit
3 Paediatric units	2Eye surgical unit
1Neurology unit	1Genito urinary surgical unit
1Cardiology unit	1Paediatric surgical unit
1Dermatology unit	1Nephrology unit
1Psychiatry unit	1Neo-natology unit
1Rheumatology unit	Chest Medicine
1Oncology unit	Transfusion Medicine
1STD/AIDS unit	

4. Intensive Care Units
    - Medical Intensive Care Unit (MICU)
    - Surgical Intensive Care Unit (SICU)
    - Cardiac Intensive Care Unit (CICU)
    - Coronary Care Unit (CCU)
5. Operation Theatres
6. Diagnostic services
    - Radiology Dept.
    - Pathology Dept. with Histopathology, Hematology and Microbiology units
7. Accident service/Trauma Surgery unit
8. Medico-legal Department
9. Maxcillo Facial Surgical Unit
10. Orthodental Unit
11. Public Health Unit
12. Medical Statistic Unit
13. Dept. of Anesthesia

District General / District Base Hospitals (Kuliyapitiya,Nikaweratiya)

All existing District General Hospitals & Base Hospitals will be renamed as District Base Hospitals. Each District will have 1 District General Hospital & 1-2 District Base Hospitals to fulfill the needs of the population.

List of Service offered:

1. Out Patient Department (OPD) with separate Preliminary Care Unit, Emergency Care Unit and Screening Facilities.
2. Clinic Facilities
3. In wards facilities
   2 Medical units
   2 Surgical units

2 Gynecology ands Obstetric units
2 Paediatric units
1Psychiatry unit
1Dermatology unit
1Orthopaedic surgical unit
1ENT surgical unit
1Eye surgical unit
2Anaesthesia Units

4. Intensive Care Unit
5. Operation Theatres
6. Diagnostic services
    - Radiology Dept.
    - Pathology Dept.

7. Medico-legal Dept.
8. Maxcillo Facial Surgical Unit
9. Public Health Unit
10. Medical Records Unit

Divisional Hospitals

All District Hospitals, Rural Hospitals, Peripheral Units Will be re-named as Divisional Hospitals (DH), irrespective of the number of beds --

Type A DH –More than 100 patient beds
Type B DH –Between 50-100 patient beds
Type C DH –Less than 50 patient beds

Each DDHS area to be served by one divisional hospital according to availability of resources.

List of Service offered:

1. Out patient care with a ETU for limited emergency and screening
2. Basic laboratory facilities
3. Minor operation facilities
4. Labour room
5. Wards:
    - 1 Maternity ward
    - 1 male & female Medical & Surgical wards each
    - One children's ward
6. Dental unit
7. Facilities for continuation of treatment of patent referred by secondary and tertiary medical institutions for a limited period of time
8. Facilities for a polyclinic including Ante-Natal, Post Natal, Family Planning, Child Health, Well Women clinic etc…
9. Ambulance

(Services of visiting consultants will be available in some of these hospitals through out-reach clinics)

Primary Medical Care Units

- Central Dispensaries &
- Maternity Homes will be renamed as PUC

List of Service offered:

1. Out patient care
2. Limited emergency care: facilities for stabilization of patients before referring to secondary or tertiary care medical institutions.
3. Facilities for a poly-clinic including Ante – Natal, Post – Natal, Family Planning, Child Health, Well Women.

Acknowledgement

The information on this topic was obtained with the assistance of Mr.P.V. Ariyawansa, Executive Assistant/District Coordinator, Sarvodaya, Kurunegala District Office, Kuliyapitiya, Sri Lanka and Mr. Neil Sirisena, District Health Education Officer, Medical Officer of Health Office, Kuliyapitiya, Sri Lanka.

8. APPENDIX X – ICD 10 Examples

B01 Chickenpox (Varicella)	diffuse papulovesicular rash; vesiculopustular rash appearing on the trunk and face; Detection of viral antigen; Isolation of the virus from skin scraping Demonstration of specific IgM in a serum
A00 Cholera	severe dehydration, acute watery diarrhoea, vomiting; isolation of Vibrio cholerae O1 or O139 from stools
A90 Dengue Fever	An acute febrile illness of 2-7 days duration with 2 or more; of the following: headache, retro-orbital pain, myalgia, arthralgia, flushed extremities, tender hepatomegaly, rash, eucopenia, hrombocytopaenia and haemorragic anifestations Isolation of the dengue virus from serum, plasma, leukocytes, or autopsy samples. Detection of viral genomic sequences serum, CSF or autopsy tissues by polymerase chain reaction (PCR). Demonstration of a fourfold or greater rise in IgG titter to one or more dengue virus antigens in paired serum samples by ELIZA or HI assay.
A91 Dengue Haemorrhagic Fever / Dengue Shock Syndrome	Rapid and weak pulse, narrow pulse pressure (- 20 mmHg) or hypotension for age, cold clammy extremities and restlessness. Positive tourniquet test Petechiae, ecchymoses or purpura Bleeding: mucosa, gastrointestinal tract, injection sites or other Haematemesis or melaena and thrombocytopenia (100,000 cells or less per mm3) and evidence of plasma leakage due to increased vascular permeability, manifested by >=20% rise in average haematocrit for age and sex >=20% drop in haematocrit following volume replacement treatment compared to baseline signs of plasma leakage (pleural effusion, ascites, hypoproteinaemia) Isolation of the dengue virus from serum, plasma, leukocytes, or autopsy samples Detection of viral genomic sequences in autopsy tissue, serum or CSF samples by polymerase chain reaction (PCR) Demonstration of a fourfold or greater change in IgG titer to one or more dengue virus antigens in paired serum samples by ELIZA or HI assay
A 36 Diphtheria	stridor characterized by laryngitis, pharyngitis or tonsillitis, and adherent membranes of tonsils, pharynx and/or nose. Isolation of toxigenic Corynebacterium diphtheriae from a clinical specimen. A rise in serum antibody (fourfold or greater)
02, A 03, A 04, A 06, A 09 Dysentery	diarrhoea with blood and or mucus and with or without fever, nausea, abdominal cramps, and tenesmus. Stool culture and ABST for sensitivity pattern.
G04 Encephalitis	A febrile illness of variable severity associated with neurological features ranging from headache to alteration of level of onsciousness and signs and symptoms suggestive of meningitis and encephalitis. Symptoms can include: headache, fever, meningeal signs, seizures, stupor, disorientation, coma, tremors, paresis (generalized), hypertonia, loss of coordination.

	Fourfold or greater rise in JE virus-specific IgG antibody in paired sera (acute and convalescent phases), ELISA, haemagglutination inhibition test or virus neutalization test, in a patient with no history of recent yellow fever vaccination and where cross-reactions to other flaviviruses have been excluded JE virus specific IgM antibody in a single blood sample in late acute phase or early convalescence JE virus-specific IgM antibody in the CSF by IgM capture ELISA or Detection of the JE virus, antigen or genome in brain, spinal cord by immunochemistry or immunofluorescence or PCR
A01 Enteric Fever (Typhoid Fever)	insidious onset of sustained fever, headache, malaise, anorexia, in children coated tongue, relative bradycardia, splenomegaly, constipation or diarrhea, nonproductive cough and may have a skin rash. Enteric fever – Isolation of Salmonella typhi from blood, stool or other clinical specimen. Serological tests based on agglutination antibodies (SAT) are of little diagnostic value because of limited sensitivity and specificity. However, the demonstration of a four fold rise in antibody titre is confirmatory of salmonella infection.
A02, A05, T61, T 62 Food Poisoning	Acute gastroenteritis in a person linked to an ingested food or liquid: or an outbreak of acute gastroenteritis in two or more persons linked by common exposure to a food or liquid ingested Isolation of certain food borne organism (e.g. Salmonella) or toxins from relevant clinical samples. Isolation of suspected organism in sufficient quantities from incriminated food samples or detection of toxins from food samples.
A82 Human Rabies	Acute neurological syndrome (encephalomyelitis) characterized by forms of hyperactivity in the majority of subjects (furious rabies) or paralytic syndromes seen less often (dumb rabies) which progresses towards coma and death usually by respiratory failure, within 10 to 14 days after developing the first symptom, if no intensive care is instituted. An exposure could be bites, scratches, contamination of mucous membranes or contamination of an open wound with saliva from a suspected rabid animal which usually should be obtained from the patient's medical history. The incubation period may vary from less than 1 week to more than 1 year, but usually falls between 30-90 days. Detection of rabies viral antigens by direct fluorescent antibody (FA) in clinical specimens, preferably brain tissue (collected at post mortem) Detection by FA on skin or corneal smear (collected ante mortem) FA positive after inoculation of brain tissue, saliva or CSF in cell culture, or in mice by intracerebral inoculation Detectable rabies-neutralizing antibody titre in the CSF of an unvaccinated person Identification of viral antigens by PCR on fixed tissue collected post

	mortem or in a clinical specimen (brain tissue or skin, cornea or saliva) Isolation of rabies virus from clinical specimens and confirmation of rabies viral antigens by direct fluorescent antibody FA testing
A27 Leptospirosis	Acute febrile illness with headache, myalgia and prostration associated with any of the following symptoms: conjunctival suffusion / conjunctival haemorrhage meningeal irritation anuria or oliguria / proteinuria / haematuria jaundice haemorrhages (from the intestines; lung bleeding is notorious in some areas), purpuric skin rash cardiac arrhythmia or failure and a history of exposure to infected animals or an environment contaminated with animal urine; commonly as an occupational hazard. Other common symptoms include nausea, vomiting, abdominal pain, diarrhoea, arthralgia. Direct microscopy (dark ground) of blood and urine Isolation from blood or other clinical materials through culture of pathogenic leptospirosis Positive serology, preferably Microscopic Agglutination Test (MAT), using a range of Leptospira strains for antigens that should be representative of local strains or using a non pathogenic leptospira strain to detect genus specific antibodies with a 4 fold rise.
B50 - 54 Malaria	A patient residing in malaria endemic area or having a history of visiting a malaria endemic area, presenting with fever or history of fever with chills & rigors and headache. (Non specific symptoms otherwise unexplained, includes – Myalgia, backache and joint pain) Demonstration of malaria parasites in blood films (mainly asexual forms) by Microscopy or Antigen detection by Rapid Detection Test.
B05 Measles	Fever and Maculopapular (i.e. non-vesicular) rash and at least one of the following: Cough, Coryza (i.e. runny nose), Conjunctivitis (i.e. red eyes) Detection of measles specific IgM antibodies in blood collected within 3-28, days of onset of rash Isolation of measles virus from urine, naso-pharyngeal aspirates or peripheral blood lymphocytes during the prodrome or rash stages of the disease
G00, A87 Meningitis	Fever of acute onset with one or more of the following signs of meningeal, irritation/inflammation, Neck stiffness, Irritability, Poor sucking (in infants), Seizures, Bulging fontanells (in infants), Other signs of meningeal irritation/inflammation, Altered consciousness Culture: Isolation of a causal organism by culturing CSF and/or blood. Antigen Detection: Demonstration of an antigen of a causal organism by methods such as latex agglutination or counter-immunoelectrophoresis, in CSF and/or blood.
B26 Mumps (Infectious Parotitis)	An illness with acute onset of unilateral or bilateral tender, self-limited swelling of the parotid or other salivary gland, lasting more

	than or equal to 2 days, and without other apparent cause. Demonstration of mumps specific IgM antibody in a single serum sample.
A20 Plague	Rapid onset of fever, chills, headache, severe malaise, prostration, with bubonic form*- extreme painful swelling of lymph nodes (buboes) in axilla or groin, pneumonic form*- cough with blood-stained sputum, chest pain, difficulty in breathing *Both forms can progress to septicaemic form with toxaemia; characterized by disseminated intravascular coagulation, hypotension and cardiac failure. Isolation of Yersinia pestis in cultures from buboes, blood, CSF or sputum or Passive haemagglutination (PHA) test, demonstrating an at least fourfold rise in antibody titre, specific for F1 antigen of Y. pestis, as determined by the haemagglutination inhibition test (HI) in paired sera.
B06 Rubella	An illness that has following characteristics: Acute onset of generalized maculopapular rash Temperature greater than 99.00F (greater than 37.20C), Arthralgia/arthritis, lymphadenopathy (Usually suboccupational, postauricular and cervical) or conjunctivitis Detection of Rubella specific IgM in blood specimen obtained within 28 days of onset of the rash. Either seroconversion or four fold rise of IgG antibody between acute and convalescence samples.
P35 Congenital Rubella Syndrome (CRS)	Surveillance case definition An illness usually manifesting in infancy resulting from rubella infection in utero and characterized by signs or symptoms from the following categories*: Cataracts/congenital glaucoma, pigmentary retinopathy, congenital heart disease (most commonly patent ductus arteriosus, or peripheral pulmonary artery stenosis), loss of hearing, purpura, splenomegaly, jaundice, meningoencephalitis, microcephaly, mental retardation, radiolucent bone disease, laboratory data consistent with congenital rubella infection *Some Children may have only one symptom Demonstration of a rubella specific IgM antibody in the infant. Almost all infants with CRS will have a positive rubella specific IgM in the 1st 6 months of life and 50-60% will be positive during the 2nd 6 months of life. Demonstration of a significant rise in Rubella specific IgG antibody in the infant during follow up or IgG rubella antibody level that persists at a higher level and for a longer time period than expected from positive transfer of maternal antibody (Maternal IgG antibody persists up to six months of age and then gradually disappears).
Not classified - Severe Acute Respiratory Syndrome	Fever (ž 38°C) and One or more symptoms of lower respiratory tract illness (cough, difficulty in breathing, shortness of breath) and

(SARS)	Radiographic evidence of lung infiltrates consistent with pneumonia or Respiratory Distress Syndrome (RDS) or autopsy findings consistent with the pathology of pneumonia or RDS without an identifiable cause. And No alternative diagnosis can fully explain the illness and History of visit to an affected area or close contact with a patient suspected to have SARS; within 10 days of the onset of the illness Isolation of SARS virus from nasopharyngeal aspirate, blood or stools. Detection of rising titres of SARS viral antibody between acute and convalescence samples.
Not classified – Simple Continued Fever of 7 days or more	A febrile illness lasting 7 days or more where no cause is found even after seven days provided basic investigations have been carried out.
A35, A34 -	Clinical picture compatible with Tetanus: Acute onset of hypertonia and/or painful muscular contractions (usually of the muscles of the jaw and neck) and generalized muscle spasms without other apparent medical cause. Diagnosis is mainly dependant on the clinical criteria. Detection of tetanus toxoid antibody in an unvaccinated and untreated patient and demonstration of a specific tetanus toxoid antibody response in a laboratory where appropriate laboratory facilities are available.
A33 - Neonatal Tetanus	Any neonatal death between 3 – 28 days of age in which the cause of death is unknown or Any neonate reported as having suffered from neonatal tetanus between 3 – 28 days of age and not investigated.
A15 – A19 Tuberculosis (Pulmonary)	Signs and symptoms suggestive of tuberculosis particularly cough of three weeks duration or more. Symptoms suggestive of Tuberculosis. Haemoptysis Loss of appetite Shortness of Breath Loss of weight Fever and night sweats Tiredness. Smear positive patient: Two sputum smears are positive for Acid Fast Bacilli (AFB), One sputum smear positive for AFB and radiological abnormalities consistent with active pulmonary tuberculosis, One sputum smear positive for AFB and culture positive for Mycobacterium tuberculosis Smear negative patient with positive culture.
A75 Typhus Fever	An acute febrile illness associated with an eschar, head ache, macular popular skin rash conjunctival injection, lymphadenopathy and profuse sweating and cough. Defervescence within 48 hours following Tetracycline therapy strongly suggestive of Rickettsial infection. Eschar may or may not be present History of tick bite or travel to scrub areas Rash may be overlooked in patients with dark skin Demonstration of a four fold rise in antibody titre by Weil-Felix test or IF test. The Weil-Felix test is less specific and less sensitive than

	the IF test. The Weil-Felix test is currently available at the Medial Research Institute and the IF test will be available in the future.
B15 – B19 Viral Hepatitis	Acute illness including acute jaundice, dark urine, anorexia, malaise, extreme fatigue, and right upper quadrant tenderness. Hepatitis A: Demonstration of Hepatitis A IgM Antibody in a serum sample. Hepatitis B: Demonstration of Hepatitis B surface antigen (HBsAg) or HBc antigen IgM in a serum sample. 38 Note 1: The anti-HBc IgM test, specific for acute infection, is not available in most countries. HBsAg, often available, cannot distinguish between acute new infections and exacerbations of chronic hepatitis B, although continued HBsAg seropositivity (>6 months) is an indicator of carrier stage. Note 2: For patients negative for hepatitis A or B, further testing for a diagnosis of acute hepatitis C, D, or E is recommended. anti-HCV positivity in a previously negative person Hepatitis C: (seroconversion) Hepatitis D: Anti-HDV positive HBsAg positive or IgM anti-HBc positive (only as co-infection or super-infection of hepatitis B) Hepatitis E: IgM anti-HEV positive
A37 Pertussis / Whooping Cough	A person with a paroxymal cough* with at least one of the following**: inspiratory 'whooping', post-tussive vomiting (i.e. vomiting immediately after coughing), Subconjuctival hemorrhage without other apparent cause, *In older children if cough lasts more than two weeks **In neonates apnoeic attacks may be present Isolation of Bordetella pertussis or Bordatella parapertussis Detection of genomic sequences by polymerase chain reaction (PCR).
A95 Yellow Fever	A disease characterized by acute onset of fever followed by jaundice within 2 weeks of onset of first symptoms. Haemorrhagic manifestations and signs of renal failure may occur; and a history of travel to a Yellow fever affected area within the last six days (longest incubation period for yellow fever) Isolation of yellow fever virus, or Detection of yellow fever specific IgM or a four-fold or greater rise in serum IgG levels in paired sera (acute and convalescent) or Positive post-mortem liver histopathology or Detection of yellow fever antigen in tissues by immunohistochemistry Detection of yellow fever virus genomic sequences in blood or organs by PCR