

Mapping Health Boundaries

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Use of GIS in Public Health

- ❖ Identify patient clusters
- ❖ Disease surveillance
- ❖ Intervention monitoring
- ❖ Trend analysis
- ❖ Tracking resource availability and distribution
- ❖ Spot mapping

dhis2



DHIS 2

- ❖ The **District Health Information Software (DHIS)**
- ❖ Used in more than 40 countries around the world
- ❖ Open source software platform for reporting, analysis and dissemination of data for all health programs
- ❖ 3 Dimensions
 - What -> Data Element
 - When -> Period
 - Where -> Organization Unit
- ❖ Supports geo data collection and Analysis

Add Manage Share < >

Disease Surveillance

Immunization

Immunization data

Inpatient BMI, Weight and Height

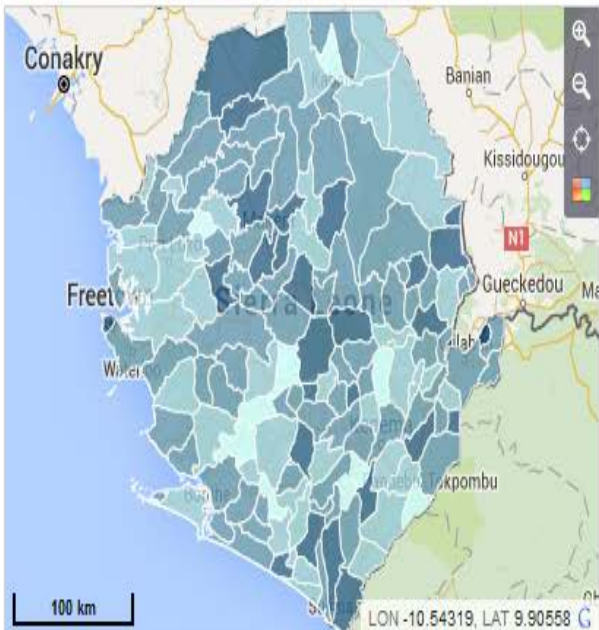
Inpatient Morbidity Mortality

Key Indicators

Malnutrition

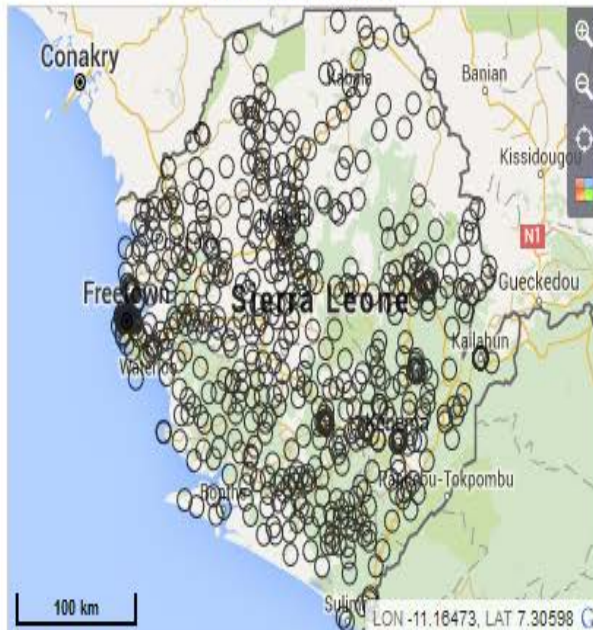
Remove Get as image Share interpretation Explore Resize

Nutrition: Moderate malnutrition rate 2013



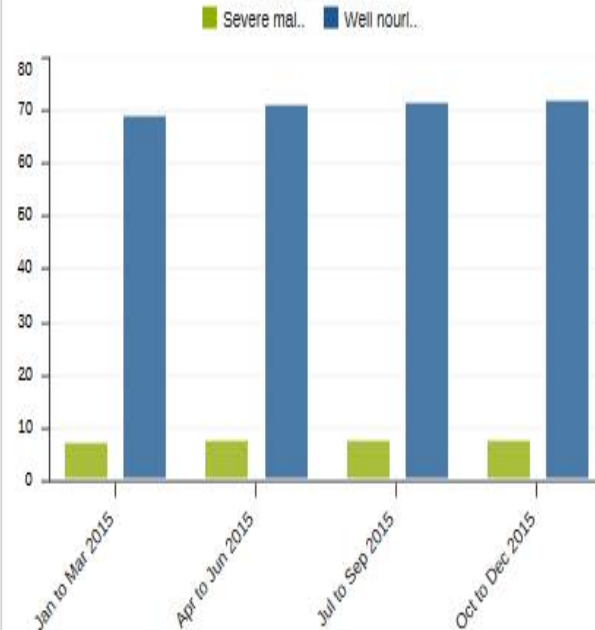
Remove Get as image Share interpretation Explore Resize

Boundaries: Facilities



Remove Get as image Share interpretation Explore Resize

Sierra Leone



Remove

Messages

QUEEN MAHUNDI 2015-10-10 TRAINING

QUEEN MAHUNDI 2015-10-10 TRAINING

QUEEN MAHUNDI 2015-10-10 TRAINING

Remove Get as image Share interpretation Explore Resize

Boundaries: Chiefdoms



Remove

Resources

DHIS 2 Home Page X

HISP EA Home Page X

DHIS 2 Launchpad site X

HISP SA home page X



Sri Lanka

- ❖ Preliminary geographic unit of public health data collection : MOH division
- ❖ MOH divisions do not always align with administrative geographic boundaries
- ❖ Digital geographic boundary maps for MOH areas not freely available
- ❖ Health Boundary maps for public health information systems were not available



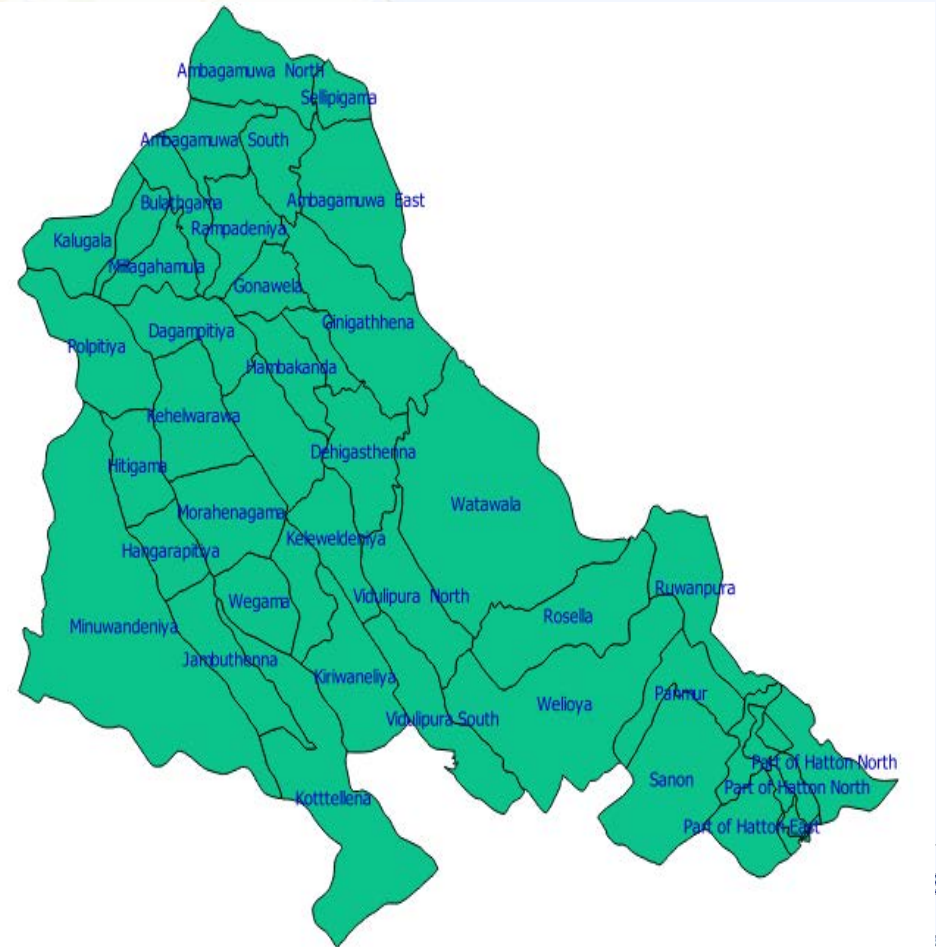
Software

- ❖ DHIS 2.x
- ❖ QGIS v 2.x
- ❖ PostGIS
- ❖ MapShaper
- ❖ FWTools
- ❖ Debian OS/Apache Tomcat/PHP 5.x/PostgreSQL



Creating Shapefiles

- ❖ Used GN divisions as the atomic units
- ❖ Source : RDHS
- ❖ Merged GN divisions to make shapefiles for MOH





Browser

- kothmale_moh.shp
- kothmale_moh_updated.sh
- kundasale.shp
- lindula_moh.shp
- lindula_moh_final.shp

Layers

- walapane
- nuwaraeliya_moh_final
- nuwaraeliya_moh
- nuwaraeliya
- ambagamuwa_final**

Shortest path

Start:

Stop:

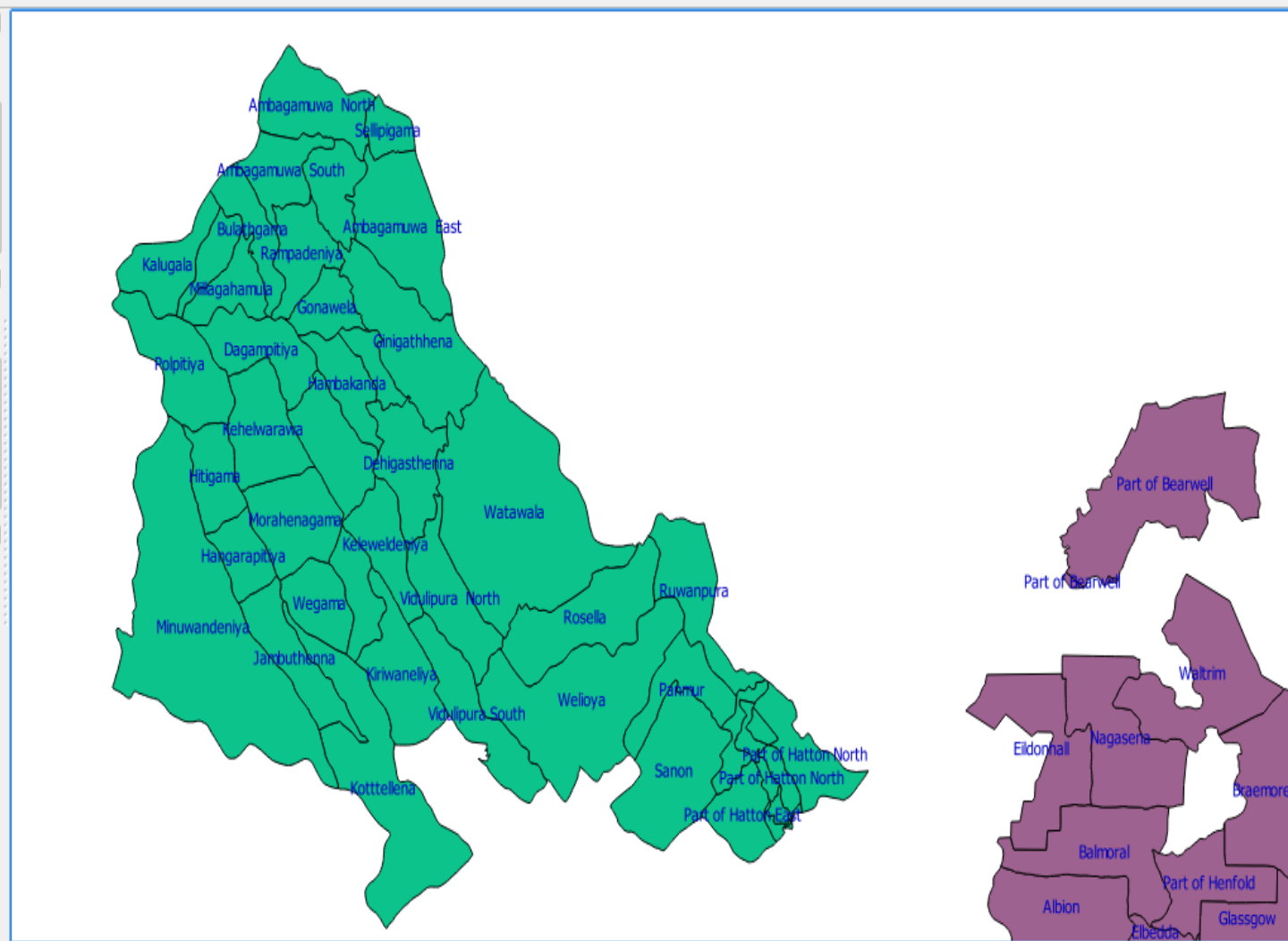
Criterion: Length

Length:

Time:

Calculate Export Clear

Help

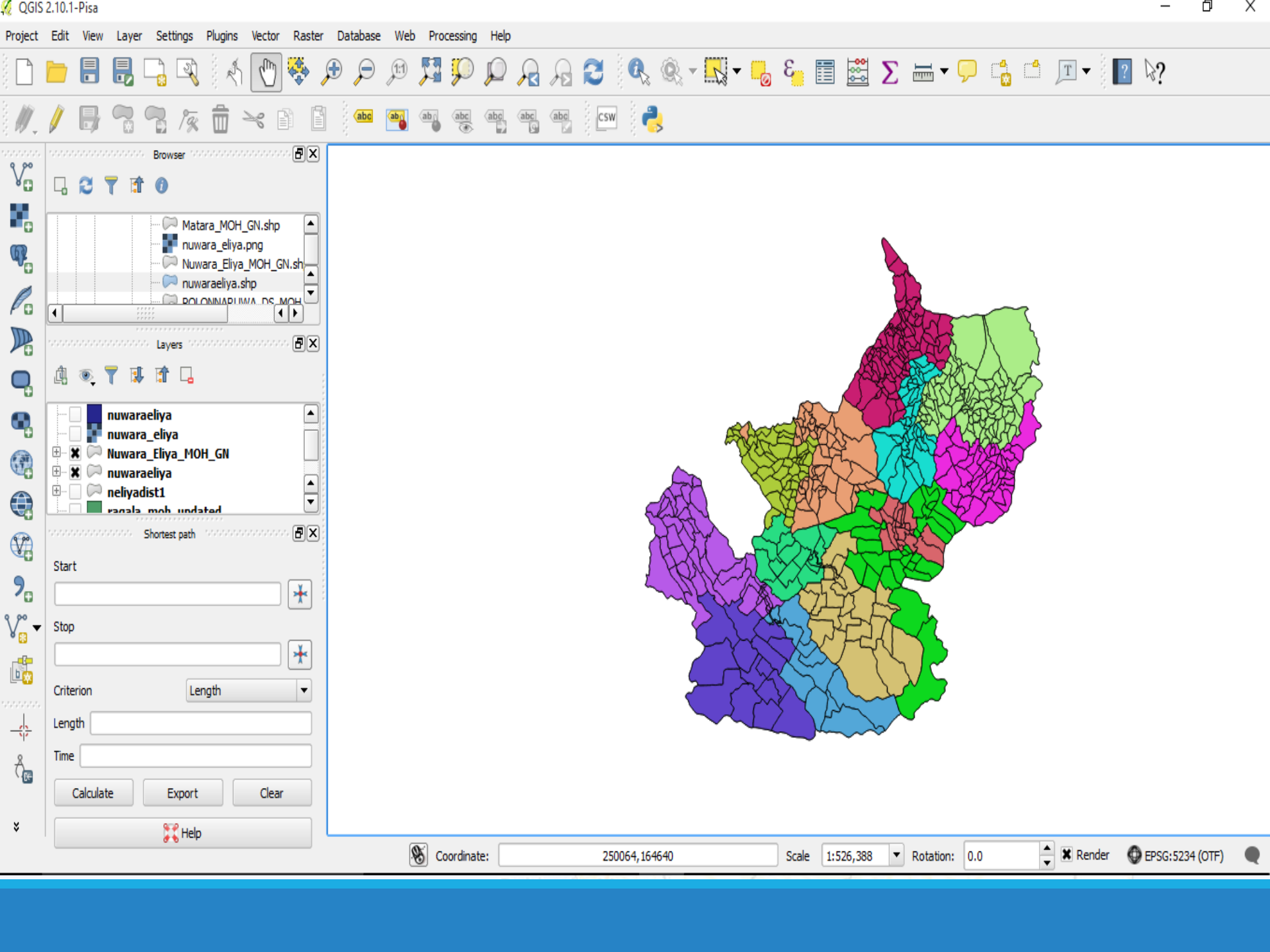




Creating Shapefiles

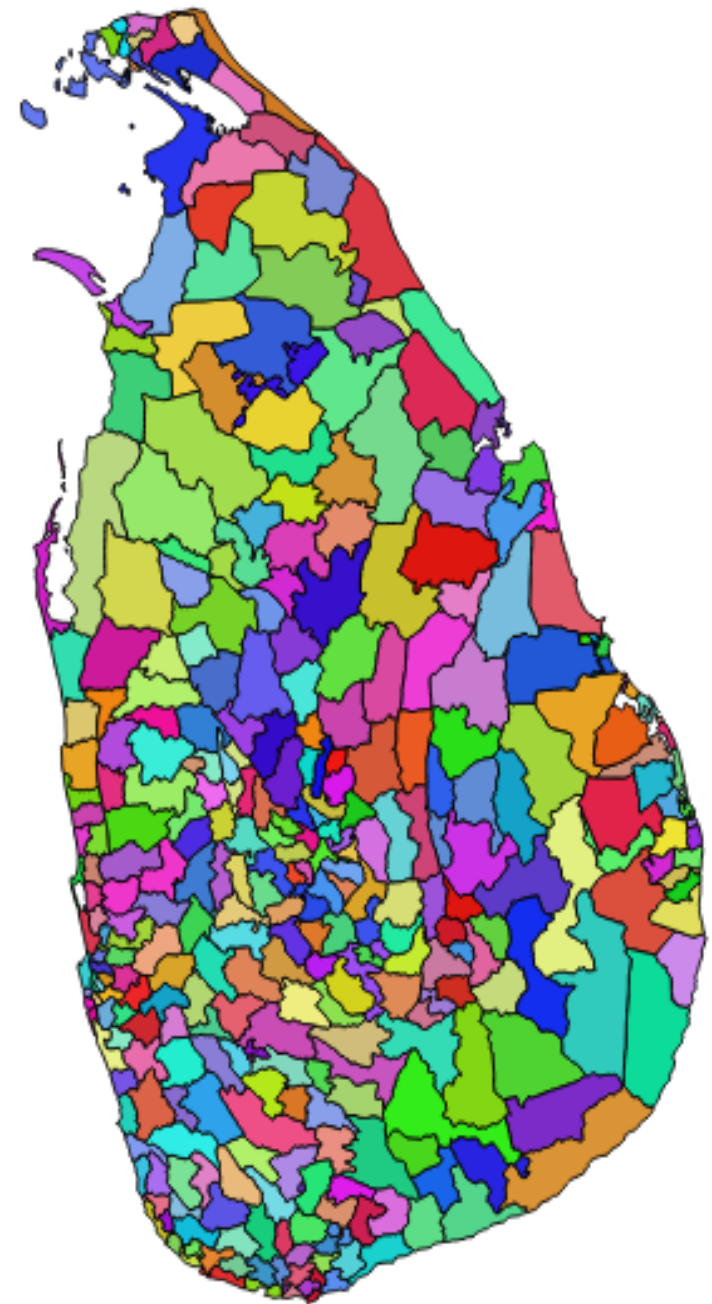
❖ Merged MOH areas to make shapefiles for RDHS divisions





Creating Shapefiles

◆ Merged RDHS areas
to make shapefiles
for Sri Lanka

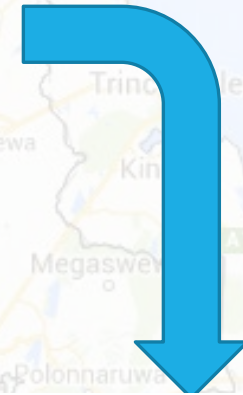




Converting Attributes to SQL

Attribute table - Nuwara_Eliya_MOH_GN :: Features total: 518, filtered: 518, selected: 0

	PROVINCE_N	PROVINCE_C	DISTRICT_N	DISTRICT_C	DSD_N	DSD_C	GND_NO	GND_N
0	CENTRAL	2	NUWARA ELIYA	3	HANGURANKETHA	NULL	481 B	Deniyagama
1	CENTRAL	2	NUWARA ELIYA	3	HANGURANKETHA	NULL	481 A	Bodhimalkada
2	CENTRAL	2	NUWARA ELIYA	3	WALAPANE	NULL	506 E	Madumana
3	CENTRAL	2	NUWARA ELIYA	3	WALAPANE	NULL	514 D	Tennahenwala
4	CENTRAL	2	NUWARA ELIYA	3	HANGURANKETHA	NULL	501	Rahathungoda
5	CENTRAL	2	NUWARA ELIYA	3	WALAPANE	NULL	521 C	Theripehe
6	CENTRAL	2	NUWARA ELIYA	3	HANGURANKETHA	NULL	481 C	Rathukurusa Jan.
7	CENTRAL	2	NUWARA ELIYA	3	WALAPANE	NULL	514	Kumbalgamuwa
8	CENTRAL	2	NUWARA ELIYA	3	HANGURANKETHA	NULL	511	Manakola
9	CENTRAL	2	NUWARA ELIYA	3	WALAPANE	NULL	518 E	Thunhityawa
10	CENTRAL	2	NUWARA ELIYA	3	WALAPANE	NULL	524 C	Purankumbura
11	CENTRAL	2	NUWARA ELIYA	3	WALAPANE	NULL	523 B	Wewatenna
12	CENTRAL	2	NUWARA ELIYA	3	HANGURANKETHA	NULL	512	Wellagiriya
13	CENTRAL	2	NUWARA ELIYA	3	WALAPANE	NULL	516 D	Mahapathana
14	CENTRAL	2	NUWARA ELIYA	3	KOTHMALE	NULL	460 K	Polwatura
15	CENTRAL	2	NUWARA ELIYA	3	HANGURANKETHA	NULL	509	Mathurata



Show All Features

Creating Hierarchy



Use of
PHP/
PostgreSQL
to create Org
Unit
Hierarchy

```
E:\project\Post Intern\BMI\Nutrition\GIS\gisphp\clonerows.php - Notepad++
File Edit Search View Encoding Language Settings Macro Run Plugins Window ?
clonerows.php
1 <?php
2 ini_set('max_execution_time', 300);
3 $host      = "host=127.0.0.1";
4 $port     = "port=5432";
5 $dbname   = "dbname=nss";
6 $credentials = "user=postgres password=13579";
7
8 $db = pg_connect( "$host $port $dbname $credentials" );
9 if(!$db){
10     echo "Error : Unable to open database\n";
11 } else {
12     echo "Opened database successfully\n";
13 }
```

The screenshot shows the pgAdmin III interface. The Object browser on the left displays a tree view of database objects, with 'organisationunit' selected. The Properties pane on the right shows the following details:

Property	Value
Name	organisationunit
OID	25402
Owner	dhis
Tablespace	pg_default
ACL	
Of type	
Primary key	organisationunitid
Rows (estimated)	14696
Fill factor	
Rows (counted)	not counted
Inherits tables	No
Inherited tables count	0
Unlogged?	No
Has OIDs?	No
System table?	No
Comment	

The SQL pane at the bottom shows the following SQL commands:

```
-- Table: organisationunit
-- DROP TABLE organisationunit;
```



Reducing Size

- ❖ Need to make shapefile less detailed
- ❖ Use of online tool MapShaper

mapshaper

Simplify

99.4%

Simplify



v0.3.9





Converting to GML

- ❖ Need to project to EPSG:4326
- ❖ FWTools used to create .gml file





Importing GML

❖ Use meta data import function of DHIS2

The screenshot displays the DHIS2 District Health Information Software 2 interface. The left sidebar contains a menu with options: Import, Meta-Data Import, Data Import, GML Import, Event Import, Import from other systems, Export, Meta-Data Export, Meta-Data Detailed Export, Data Export, Event Export, and Export to other systems. The main content area is titled 'GML Import' and includes a note: 'Note: Only import of GML data for existing organisation units is supported.' Below the note is a form with a 'File' field containing a 'Choose File' button and 'No file chosen' text, a 'Dry run' dropdown menu set to 'No', and an 'Import' button. A yellow box below the form contains a 'Display import summary' link and a log of import activities: '2015-10-10 10:48:28 Import done. Completed in 12.19 seconds. ✓', '2015-10-10 10:48:16 Importing 14696 OrganisationUnits', and '2015-10-10 10:48:15 Importing meta-data'.



Challenges Encountered

- ❖ Obtaining info on GN -> MOH
- ❖ Conversion to EPSG:4326 was not available in ogr2ogr. Had to update .csv from repository
- ❖ Handling large org unit table with multiple hierarchy (>14500 entries)
- ❖ Dealing with null values
- ❖ Dealing with Duplicate names (DHIS 2 required unique uid, code or name)
- ❖ Dealing with special characters in GN division names
- ❖ Dealing with SQL constraints of DHIS2 database

Features of GIS Module



Boundary Layer

The screenshot displays a web-based GIS application interface. The main map shows a geographical area of Sri Lanka with various administrative boundaries highlighted in grey. The interface includes a navigation toolbar at the top with buttons for back, home, and search, and a layer stack on the right side. The layer stack lists several layers, including 'Event layer', 'Facility layer', 'Boundary layer', and four 'Thematic layer' options. The 'Boundary layer' is currently selected and has an opacity of 80. The left sidebar shows a tree view of organization units, with 'Central' selected. The map itself shows various locations and roads, with a scale bar at the bottom left indicating 20 km. The coordinates at the bottom right are LON 80.71066, LAT 7.52921.

Organisation units

- Select organisation unit levels
- Ambagamuwa
- Nuwara Eliya
- Sri Lanka
 - Central
 - Eastern
 - North Central
 - North Western
 - Northern
 - Sabaragamuwa
 - Southern
 - Uva
 - Western

Layer stack / opacity

- Event layer 80
- Facility layer 100
- Boundary layer 80
- Thematic layer 1 80
- Thematic layer 2 80
- Thematic layer 3 80
- Thematic layer 4 80
- OpenStreetMap 100
- Google Hybrid 100
- Google Streets 100

Facility layer legend

Thematic layer 1 legend

Thematic layer 2 legend

Thematic layer 3 legend

Thematic layer 4 legend



Boundary Layer

The screenshot displays a web-based GIS application interface. The main map area shows a map of Sri Lanka with a boundary layer overlay. The interface includes a top navigation bar with options like 'Table', 'Chart', 'Map', 'About', and 'Home'. A left sidebar titled 'Boundary layer' contains an 'Organisation units' list with folders for 'Central', 'Eastern', 'North Central', 'North Western', 'Northern', 'Sabaragamuwa', 'Southern', 'Uva', and 'Western'. A right sidebar titled 'Layer stack / opacity' lists layers such as 'Event layer', 'Facility layer', 'Boundary layer', and four 'Thematic layer' options, each with a visibility checkbox and an opacity slider. Below the layer stack are legends for 'Facility layer legend' and 'Thematic layer 1 legend' through 'Thematic layer 4 legend'. The map shows various geographical features, including cities like Colombo, Kandy, and Nuwara Eliya, and national parks like Wasgamuwa and Horton Plains. A scale bar at the bottom left indicates 20 km, and coordinates (LON 80.71615, LAT 7.03609) are shown at the bottom right.



Boundary Layer

Boundary layer

Organisation units

- rdhs, moh, gn
- Ambagamuwa
- Nuwara Eliya
 - Central
 - Eastern
 - North Central
 - North Western
 - Northern
 - Sabaragamuwa
 - Southern
 - Uva
 - Western

Options Update

Layer stack / opacity

- Event layer 80
- Facility layer 100
- Boundary layer 80
- 1 Thematic layer 1 80
- 2 Thematic layer 2 80
- 3 Thematic layer 3 80
- 4 Thematic layer 4 80
- OpenStreetMap 100
- Google Hybrid 100
- Google Streets 100

Facility layer legend

Thematic layer 1 legend

Thematic layer 2 legend

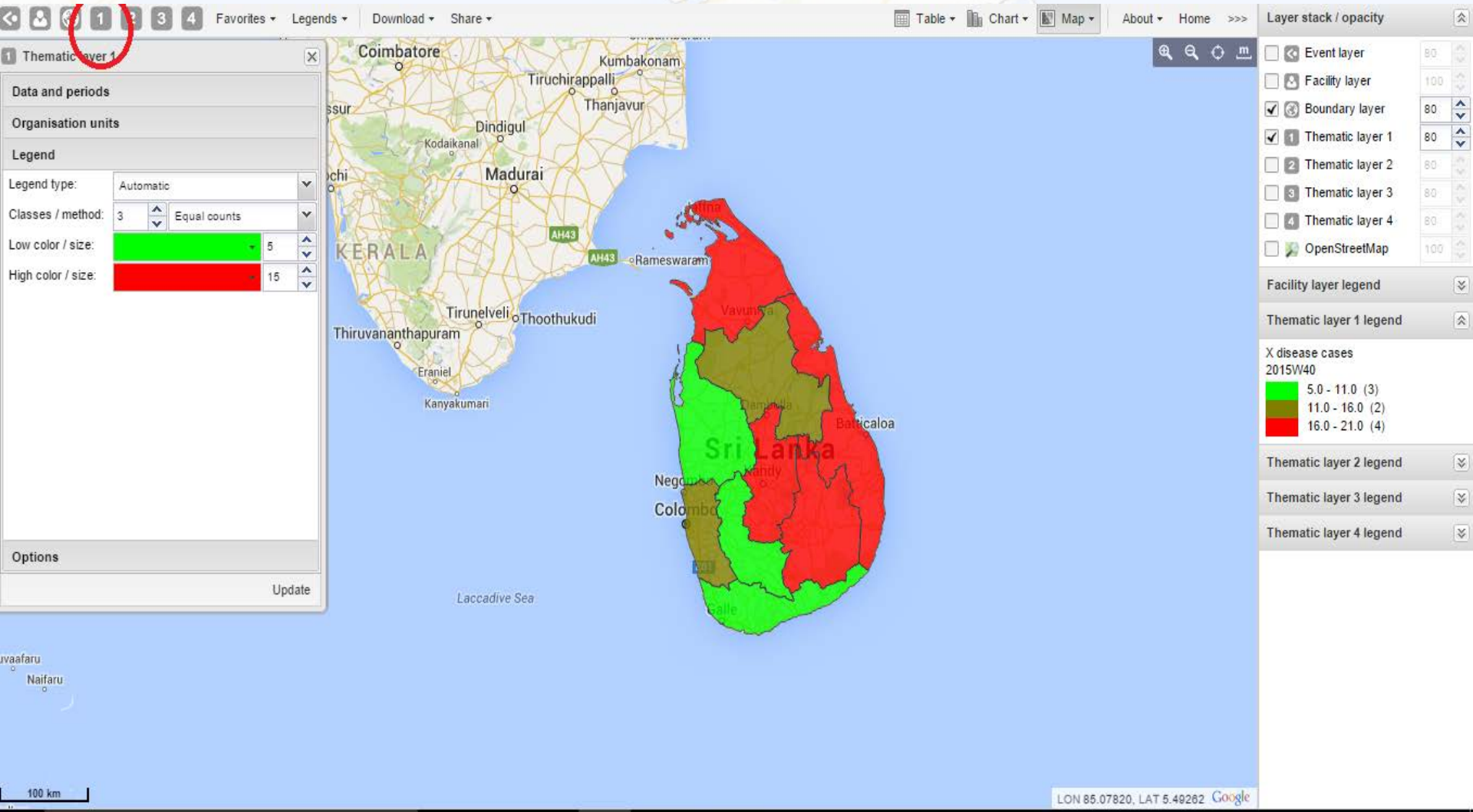
Thematic layer 3 legend

Thematic layer 4 legend

LON 80.82954, LAT 7.09886 Google

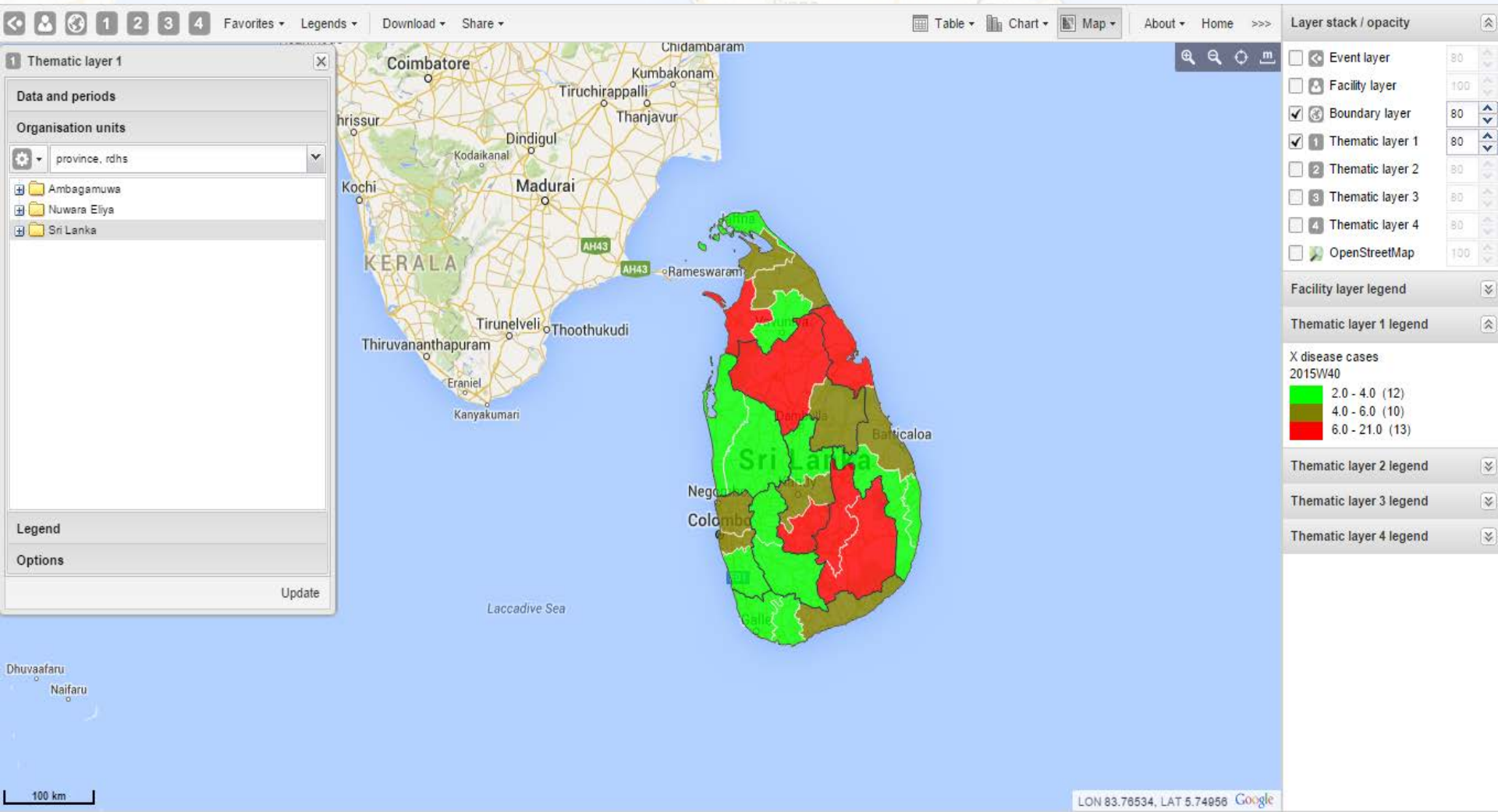


Thematic Layer



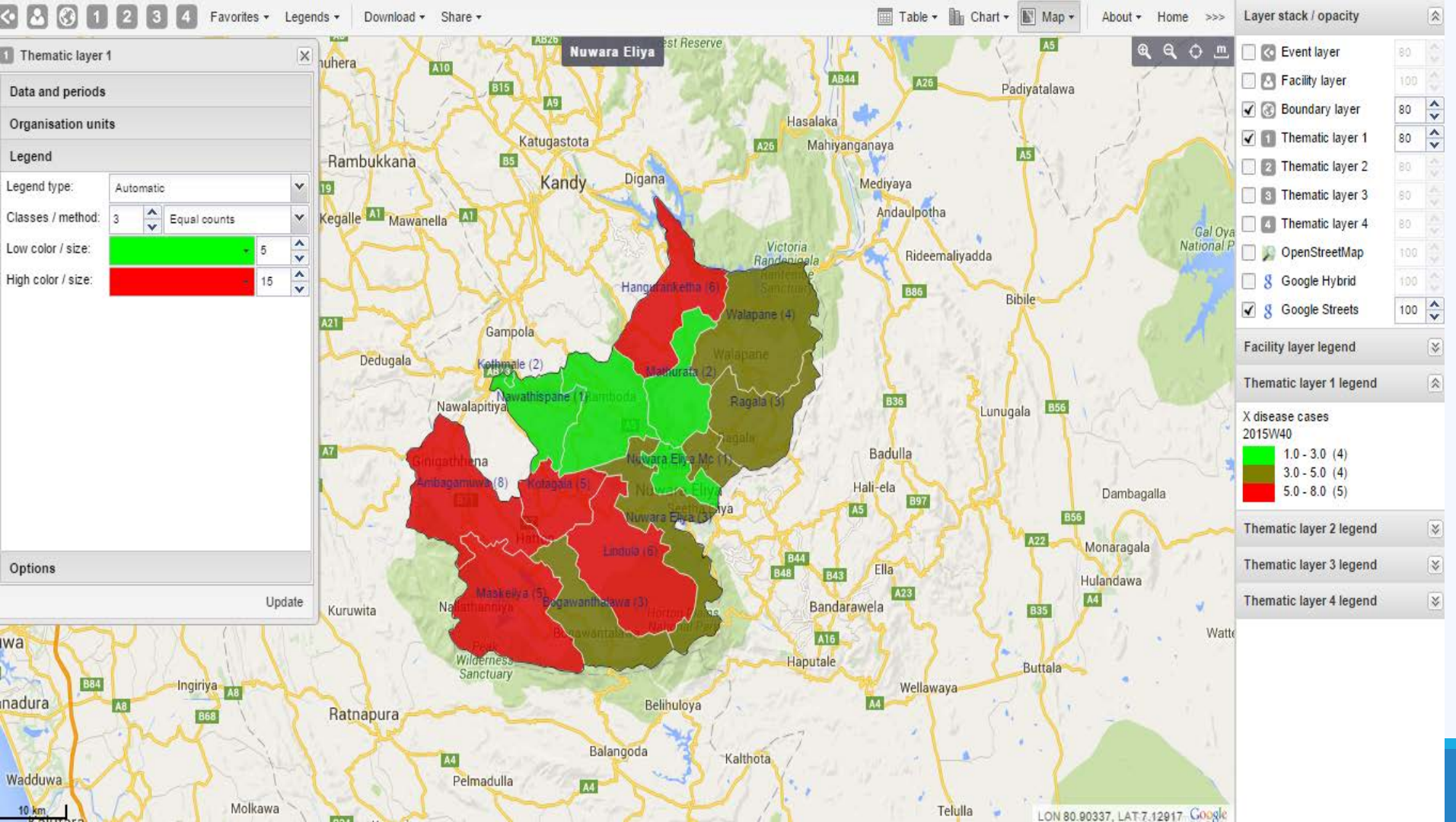


Thematic Layer





Thematic Layer





Event Layer

The screenshot shows a web application interface for an Event Layer. The main map displays several black dots representing events. A popup window titled "Event" provides details for a specific event:

Event	
Organisation unit	Ngelehun CHC
Event date	2012-10-04 00:00:00.0
Longitude	-11.378576039802283
Latitude	7.486663482151926
Age	5.0
Gender	Male

The left panel, titled "Event layer", contains a "Data elements" section with filters for "Program" (Inpatient morbidity and mortality) and "Stage" (Single-Event Inpatient morbidity and mortality). Below this are lists for "Available data elements" (Admission Date, Diagnosis (ICD-10), Discharge Date, Mode of Discharge) and "Selected data elements" (Age: 10, Gender: Male). The bottom of the panel has sections for "Periods" and "Organisation units", and an "Update" button.

The right panel, titled "Layer stack / transparency", shows a list of layers with their transparency values:

- Event layer: 90
- Facility layer: 100
- Boundary layer: 80
- Thematic layer 1: 80
- Thematic layer 2: 80
- Thematic layer 3: 80
- Thematic layer 4: 80
- OpenStreetMap: 100
- Google Hybrid: 100
- Google Streets: 60

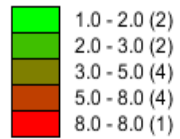
Below the layer stack are legends for "Facility layer", "Thematic layer 1", "Thematic layer 2", "Thematic layer 3", and "Thematic layer 4".



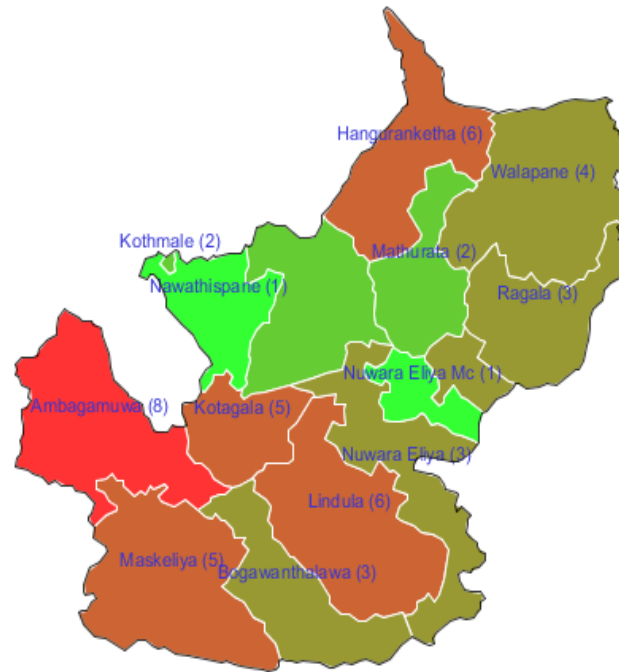
Download Map

Cases X Nuwara Eliya : Week 40

X disease cases
2015W40



10 km





Maps on Dash Board

dhis2

District Health Information Software 2

admin admin (update profile!) • Write feedback • Share

Profile

Messages

Interpretations

n

Add

Manage

Share

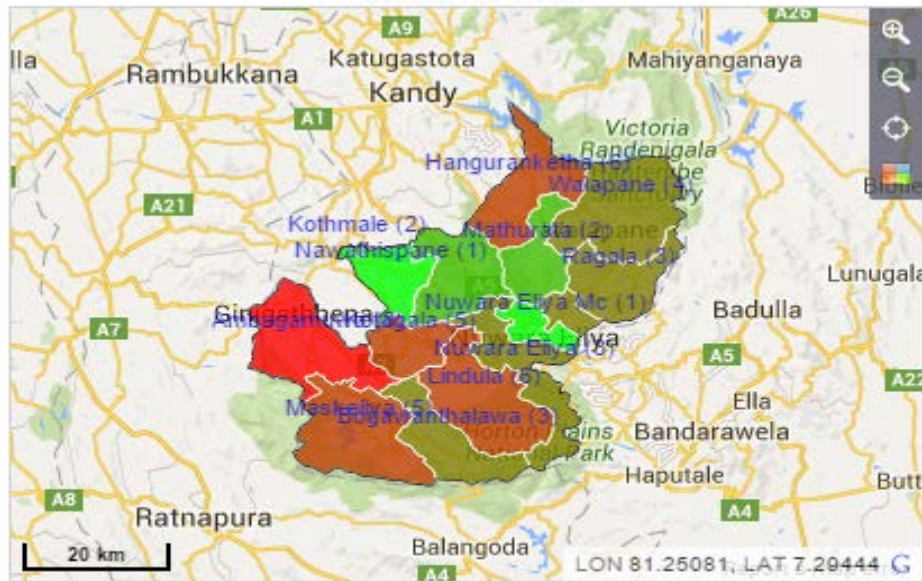
<

>

Nuwara Eliya

Remove Get as image Share interpretation Explore Resize

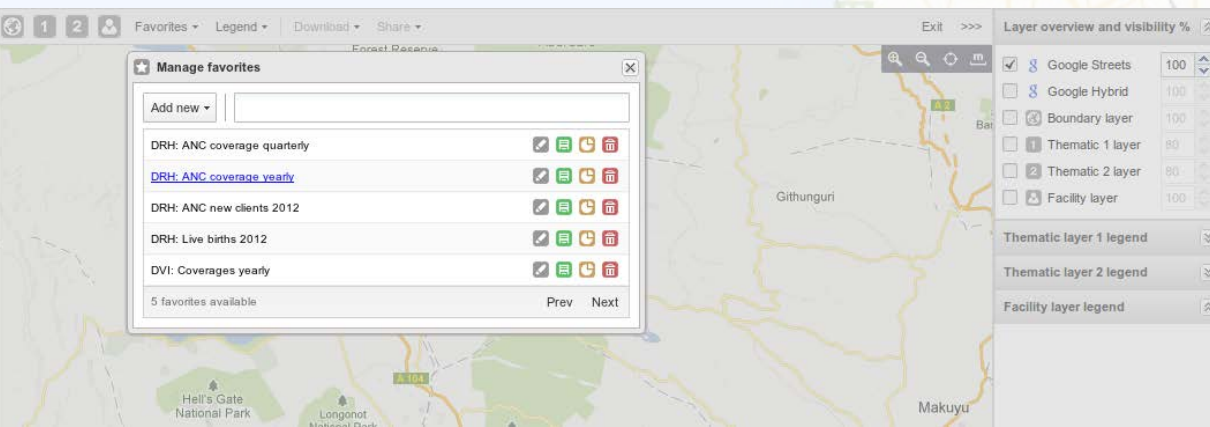
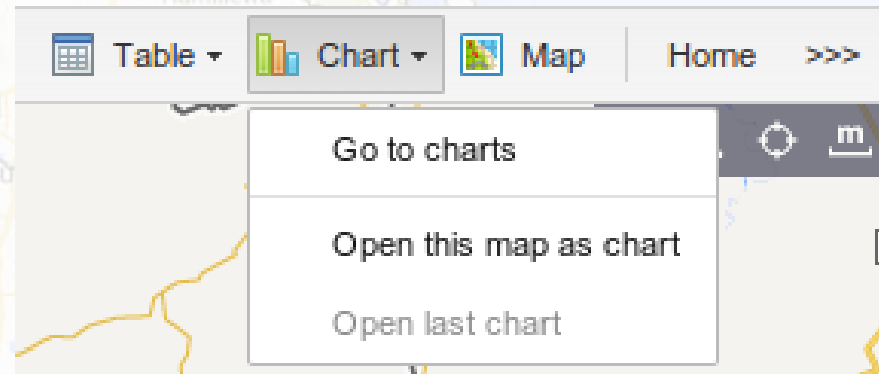
NE_wk40_case_x





GIS Tools in DHIS2

- ❖ Favorite maps
- ❖ Create predefined legend sets
- ❖ Download map as image
- ❖ Share map interpretation
- ❖ Embed maps in any web page
- ❖ Analysis integration





How to Obtain Support

- ❖ Visit HISSL Forum
- ❖ Separate Content Area on Public Health Informatics
- ❖ Separate category on DHIS2

The screenshot shows the HISSL Forum website. At the top, there is a teal navigation bar with the HISSL logo and links for Home, eHealth Asia, Journal, Ethics, Forum, and Contact Us. Below the navigation bar, there is a search and login section with fields for Username and Password, and a Login button. There are also links for Remember me, Forgot your password?, Forgot your username?, and Create an account. Below the login section, there is a breadcrumb trail for Forum > Index and a Board Categories dropdown menu with a GO button. The main content area displays a list of forum categories in a table format:

Category	Topics	Replies	Last Post
Announcements	2	2	Last Post: Career Opportunities ... by Pamod Amarakoon 2 months 3 days ago
Assistance	0	0	No Posts
Health Informatics Training and Education	3	0	Last Post: DHIS 2 Academy India ... by Pamod Amarakoon 1 month 1 day ago
General Discussions This is the place to discuss General eHealth issues/topics	1	0	Last Post: Sri Lankan eHealth H ... by Pamod Amarakoon 3 months 5 days ago
eHealth Policy and Roadmap	0	0	No Posts



danke

謝謝

ngiyabonga

tesekkür ederim

tapadh leat

thank you

gracias

mochchakkeram

go raibh maith agat

bedankt

hvala
mauruuru

dziękuję

sagolun

sukriya

kop khun krap

grazie

arigatō

takk

dakujem

мерси

obrigado

terima kasih

감사합니다

ευχαριστώ

merci



Biomedical Informatics Sri Lanka

Quality Information for Better Healthcare