

Integrated PEPFAR-Supported Site List (iPSL)

GIS supplement

Draft version for comment and discussion, April 10, 2015

DRAFT

Spatial Data in DATIM

Spatial data are essential descriptors of PEPFAR sites and will facilitate a large step towards institutionalizing the use of geographic information for decision support in PEPFAR. DATIM includes a GIS module which supports maps of areas, clinical sites, and basic facility catchment area analysis. Maps created in DATIM may be shared as favorites, placed on a dashboard, and exported for use in documents and presentations.¹ This brief document provides information on how to meet requirements for spatial data capture and management in DATIM.

The Geography of Clinical Sites - Points

In mid-July clinical sites in DATIM must have associated latitude and longitude. DATIM enforces the following standards on geographic data: coordinates must be recorded as geographic latitude/longitude (decimal degrees) in the WGS84 datum/reference ellipsoid (e.g. -25.34435, 131.03440). We recommend a precision of five decimal places and no less than four. Coordinates with values for only two decimal places could indicate a location more than one kilometer away from the intended location (Table 1).

decimal places	degrees	N/S or E/W at equator
0	1.0	111.32 km
1	0.1	11.132 km
2	0.01	1.1132 km
3	0.001	111.32 m
4	0.0001	11.132 m
5	0.00001	1.1132 m

Table 1. Decimal places and precision

Similar problems with precision can occur when coordinates are collected in one datum and displayed in another. Latitude and longitude are useful in relation to a datum, which is a model for representing the shape of the earth. Earth's shape is irregular; it's kind of lumpy. If we reference latitude and longitude in the wrong datum, coordinates could be off by hundreds of meters.

¹ DHIS2, Using GIS. <https://www.dhis2.org/doc/snapshot/en/user/html/ch17.html>

Errors in latitude and longitude pairs might not be apparent until visualized on a map. Common errors include transposing latitude and longitude and omitting the (-) value to indicate latitudes below the equator or longitudes west of the Prime Meridian. Annex 2 of WHO's Creating a Master Health Facility List, "Determination of geographic coordinates" compares methods of assigning coordinates in terms of the precision they offer.² The annex also provides useful instructions on how to collect latitude and longitude with a GPS receiver. We strongly recommend reading the Annex in combination with this guidance.

Assigning geographic coordinates

Over half of PEPFAR's approximately 46,000 clinical sites have associated geographic coordinates through Phase I. There are numerous potential sources available to OUs for obtaining and assigning missing coordinates. *It is not necessary to survey clinical sites with a GPS device to fulfill this requirement.* What follows is a list of sources for clinical site geographic coordinates that are or may be readily at hand. The sources are listed in the order that is likely to be easiest:

Master Facility List (MFL): Geographic coordinates will likely be present in an existing MFL if one exists. In the absence of an MFL, other partner government-owned official lists may be a valuable source of coordinates.

Shapefile: For every OU there is information on the location of at least some health facilities in an existing shapefile. These may be found within the interagency space or among ministries of health, central statistical agencies, and implementing partners.

Gazetteer: A gazetteer is a dictionary for geography. The NGA GEOnet Names Server (GNS) provides lists, with geographic coordinates, of populated places and features (including some hospitals).³

DATIM: it is possible to use basemaps (OSM; Google) in DATIM to identify coordinates for clinical sites. DATIM displays coordinates that correspond to the location of the mouse pointer on the map. This function can identify coordinates for a site that lack coordinates and can help improve the precision of existing coordinates. See Figure 1 (at end of document) for an illustration of how a clinical site coordinate pair is validated by the OSM basemap.

² WHO's Creating a Master Health Facility List, "Determination of geographic coordinates", http://www.who.int/healthinfo/systems/WHO_CreatingMFL_draft.pdf

³ NGA GEOnet Names Server, <http://geonames.nga.mil/gns/html/>

Web-based map platforms: OpenStreetMap, Google Maps, and Google Earth.⁴ Note: Google Earth is software which, while approved for use on some U.S. Government systems, must be installed by an authorized computer systems administrator.

If a source of geographic coordinates is not obvious, contact DATIM Support for assistance on identifying potential sources of geographic coordinates for clinical sites.

Geographic Exactness

In the early stages of geographic data development, it is acceptable to use approximate geographic coordinates for a clinical site. Unless a team has surveyed the clinical site with a GPS device or extracted the exact location of the site from high resolution satellite imagery, use the Geographic Exactness code 2 (approximate). If you don't know the datum in which coordinates were captured, you can tag your coordinates as approximate. Over time, SIMS and other site visits will provide opportunities to replace approximate coordinates with exact, GPS-derived coordinates.

code	name
1	Exact
2	Approximate

Geographic Class

This data element is not required. However, the code works with the precision code to indicate what a lat-long pair represents. Clinical sites are understood to be “brick-and-mortar” structures but the lat-long used to describe them may, in some cases, only be as precise as the populated place in which the clinical site exists. This would result in a precision of 2 (approximate) and a class of 2 (populated place). A GPS survey of the clinical site would provide a precision of 1 (exact) and a class of 3 (structure). Used in combination with latitude and longitude, geographic exactness and class codes can enable analysis that relates with precision clinical and community sites at multiple geographic scales.

code	name
1	Administrative Region
2	Populated Place
3	Structure
4	Other Topographical Feature

⁴ <https://www.openstreetmap.org/>; <https://www.google.com/maps>; <https://www.google.com/earth/>

The Geography of Community-based Services - Polygons

Administrative units capture the geography of community-based sites in iPSL (Figure 2). DATIM users can use the same geography to develop maps of aggregate clinical site indicator data. As with geographic coordinates for health facilities, central statistical agencies or ministries of health are likely sources of authoritative shapefiles, whether they represent administrative boundaries or health districts. In some country contexts there are national mapping agencies which have the responsibility for developing authoritative digital maps.

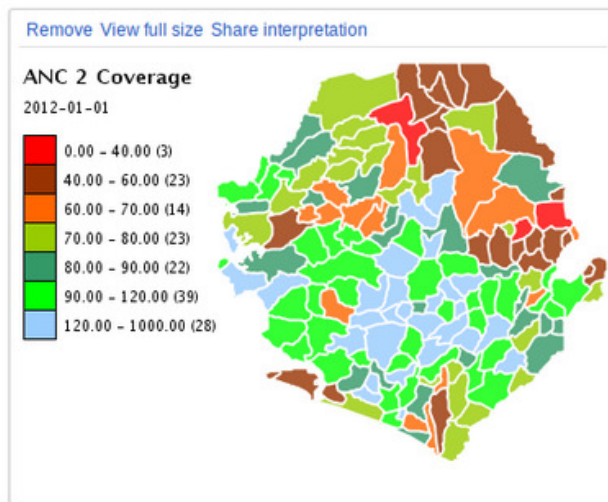
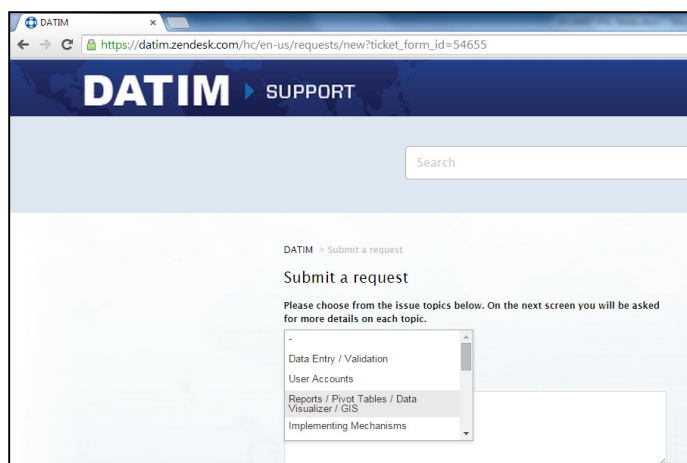


Figure 2. Example of polygon data in DATIM (dhis2)

OUs can send digital polygons (shapefiles, etc.) that accurately represent their administrative hierarchy to DATIM Support. DATIM Support can adapt shapefiles for use in DATIM and load the maps into the DATIM environment. Simply visit DATIM Support, select GIS among the request topics, and upload a zipped shapefile. You will receive a response with any questions and an estimate of the loading time.



DATIM Support screen

If OUs do not have digital polygons that match their chosen administrative hierarchy there is support available centrally to identify a suitable shapefile or possibly customize an existing file. Once a map is loaded into DATIM, OUs will be able to develop maps of indicators at that subnational unit level.

Importing and/or manual entry of geospatial data in DATIM

DATIM includes an import function, described in detail here:

<https://www.dhis2.org/doc/snapshot/en/user/html/ch18s02.html>. The method described there is one of several ways to import geographic data into DATIM and DATIM Support can assist with this. Once coordinates are loaded, the GIS module in DATIM will function. The import will also automatically populate the latitude and longitude fields in the clinical site Organization Unit profiles.

Edit organisation unit

Details

Name * ec Afsondering Clinic

Short name * ec Afsondering Clinic

Description

Code p.za.NDOH (OU5uid).Fws0A9spb9F

Opening date * 1969-12-31

Closed date 1969-12-31

Comment

Longitude (optional)

Latitude (optional)

Latitude and longitude as attributes of an organization unit

References

International Aid Transparency Initiative (IATI). Code lists, v1.04.

<http://iatistandard.org/codelists/>

MEASURE Evaluation. An Overview to Spatial Data Protocols for HIV/AIDS Activities: Why and How to Include the "Where" in Your Data. 2011.

<http://www.cpc.unc.edu/measure/publications/ms-11-41a>

WHO. Creating a Master Health Facility List. Geneva, World Health Organization, 2012.

http://www.who.int/healthinfo/systems/WHO_CreatingMFL_draft.pdf

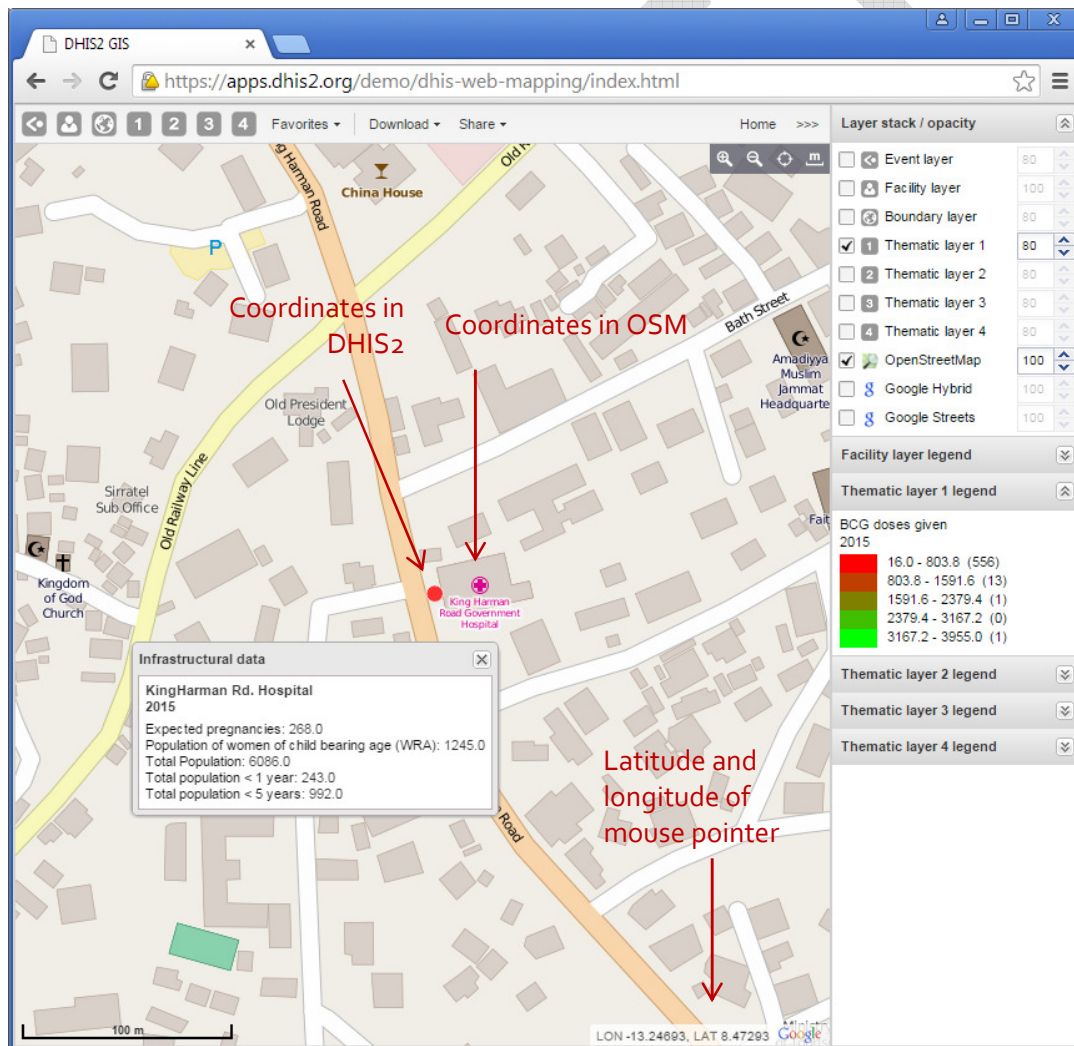


Figure 2. King Harman Road Hospital in DHIS2 and Open Street Map (OSM)