

MEASURE Evaluation

Working Paper Series

PLACE **Mapping and Size Estimation Module**

October 2012

WP-12-126



MEASURE Evaluation is funded by the U.S. Agency for International Development (USAID) through cooperative agreement GPO-A-00-03-00003-00 and is implemented by the Carolina Population Center at the University of North Carolina at Chapel Hill, in partnership with Futures Group, ICF International, John Snow, Inc., Management Sciences for Health, and Tulane University. The opinions expressed are those of the authors and do not necessarily reflect the views of USAID or the U.S. government.

Carolina Population Center
University of North Carolina at Chapel Hill
206 W. Franklin Street
Chapel Hill, NC 27516
Phone: 919-966-7482
Fax: 919-966-2391
measure@unc.edu
www.cpc.unc.edu/measure



Printed on recycled paper



This working paper series is produced by MEASURE Evaluation in order to speed the dissemination of information from research studies. Working papers may be under review or awaiting journal publication, and are distributed as received from the authors with minor editing and formatting adjustments.

The series and other publications are available from the MEASURE Evaluation at:

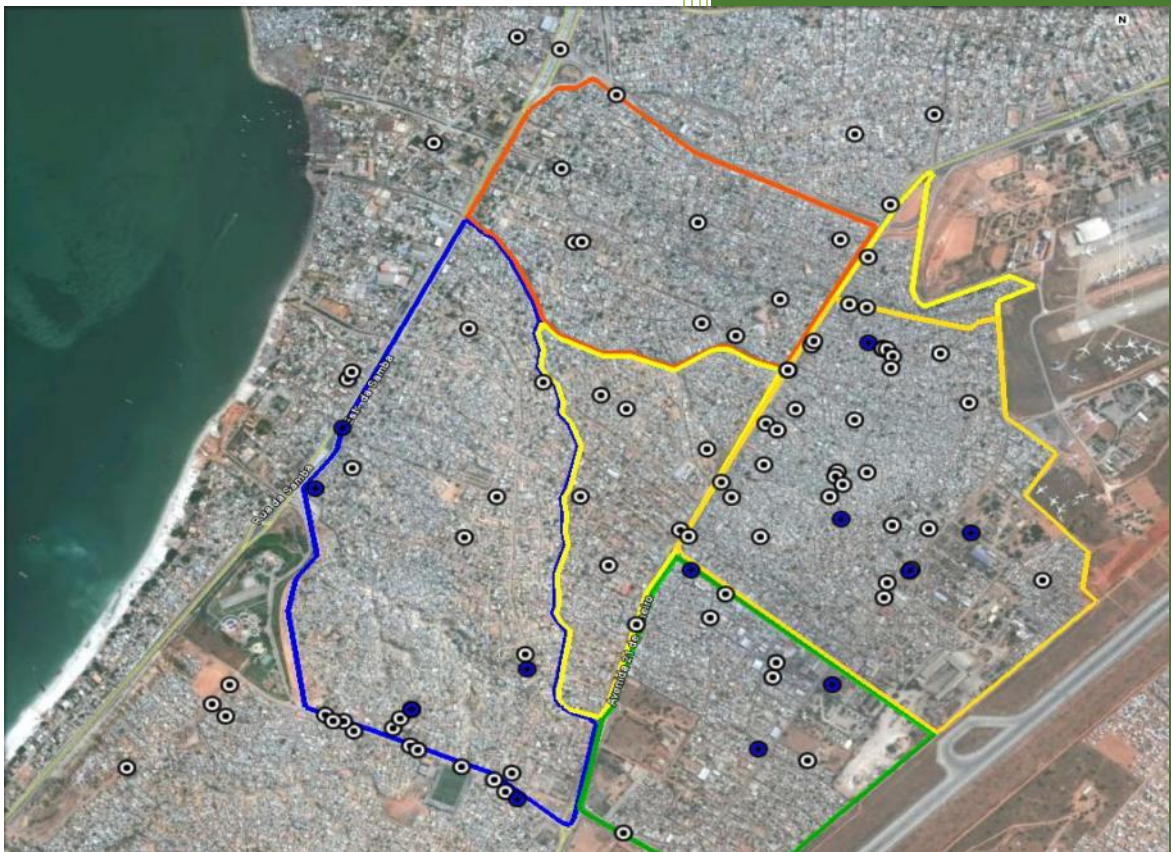
<http://www.cpc.unc.edu/measure>



+

PLACE

Mapping and Size Estimation Module



MEASURE EVALUATION
PLACE

Mapping Sexual Network Sites

OVERVIEW AND PURPOSE OF PLACE.....	3
OVERVIEW AND PURPOSE OF MAPPING	4
<i>STEPS IN THE MAP CREATION PROCESS – OVERVIEW.....</i>	<i>5</i>
PREPARING YOUR COMPUTER	8
COLLECTING SPATIAL DATA	8
PREPARE FOR COLLECTION OF SPATIAL DATA	8
TRAIN GPS OPERATORS.....	9
<i>Components of training</i>	<i>9</i>
COLLECT DATA.....	10
DOWNLOAD COORDINATES INTO STUDY DATABASE	11
MAPPING SITES AND LINKING MAPS TO PLACE DATA.....	12
ORGANIZING GPS DATA – PART 1 (NO COORDINATES IN DATABASE)	13
ORGANIZING GPS DATA – PART 2 (COORDINATES ALREADY IN DATABASE)	14
MAPPING PLACE VENUES AND OTHER SITES.....	14
PUBLISHING MAPS	18
SIZE ESTIMATION.....	19
DETERMINING VENUE WEIGHTS.....	19
SIZE ESTIMATION TECHNIQUE 1: VENUE-BASED ESTIMATES	19
SIZE ESTIMATION TECHNIQUE 2: ESTIMATES BASED ON INDIVIDUAL-LEVEL DATA	19
APPENDIX A: QUICK START GUIDE	21
APPENDIX B: ADMINISTRATIVE REGION-LEVEL MAPPING.....	22
<i>ADMINISTRATIVE REGION-LEVEL DATA</i>	<i>22</i>

Overview and purpose of PLACE

PLACE is a rapid assessment tool to monitor and improve AIDS prevention program coverage in areas where HIV transmission is most likely to occur. PLACE is designed for local program managers who want to know where to target resources to prevent new infections. PLACE systematically identifies gaps in current prevention programs, enhances the local use of these findings to improve program delivery, and monitors program coverage over time using easy-to-understand indicators and coverage maps. Although PLACE findings may be used to inform several AIDS control activities, the focus is on monitoring behavior and program coverage.

Programs covered include condom distribution, peer health education, access to voluntary counseling and testing (VCT), treatment of sexually transmitted infections (STIs), harm reduction programs for injecting drug users, and tuberculosis control. PLACE maps can be integrated with other mapping efforts that monitor infectious disease, health service availability, population density, and environmental change.

Steps in the place method are outlined below:

Methods	Outputs
STEP 1 — Prepare a PLACE strategy	
<u>Steering committee</u> A steering committee identifies priority prevention areas, decides where PLACE will be implemented, makes protocol decisions, obtains ethical approval, and plans implementation.	<ul style="list-style-type: none"> ▲ PLACE strategy ▲ Map of priority prevention areas ▲ Final indicators ▲ Ethical approval
STEP 2 — Identify venues where people meet new sexual and needle-sharing partners	
<u>Community informant interviews</u> Trained interviewers ask approximately 400 community members to name venues and events where people meet new sexual partners and venues where drug injectors socialize.	<ul style="list-style-type: none"> ▲ List of venues and events where people meet new sexual partners, where IUDs can be reached ▲ Characteristics of community informants
STEP 3 — Visit, map, and characterize all venues reported	
<u>Visits, on-site interviews, and global positioning system (GPS) data collection</u> Interviewers obtain information from people knowledgeable about the venue and use GPS devices to map each venue.	<ul style="list-style-type: none"> ▲ Map of venues ▲ Description of venues ▲ Indicators of program coverage at venues ▲ Initial list of priority sites
STEP 4 — Characterize people who socialize at venues	
<u>Interviews with individuals socializing at venues</u> Trained interviewers ask 960 individuals socializing at 40 venues about their sexual behavior and exposure to AIDS prevention programs.	<ul style="list-style-type: none"> ▲ Sociodemographics ▲ Sexual behavior ▲ Drug use, sex work, STI symptoms ▲ Exposure to prevention programs
STEP 5 — Use results to improve programs	
<u>Analysis, report, and workshops</u> Local stakeholders review the findings and	<ul style="list-style-type: none"> ▲ PLACE report ▲ Stakeholder recommendations

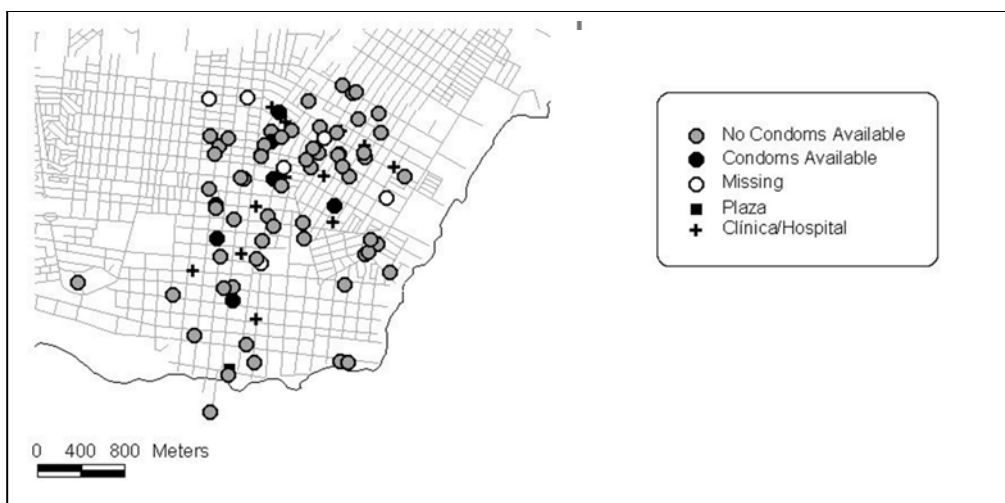
develop action plans in participatory workshops.

- ▲ Action plans
- ▲ Maps of priority sites
- ▲ Monitoring indicators

Overview and purpose of mapping

An important aspect of the PLACE method is the creation of maps. Identifying sites on a map of the Priority Prevention Area (PPA) can convey practical information that can inform HIV/AIDS prevention activities. Seeing the geographic distribution of sexual network sites over the assessment area can show how and where sites are grouped. Prevention program coverage can be displayed by using different colored dots to represent sites that have been reached with prevention activities and those that have not. For example, Figure D1.1 illustrates condom availability at sites. Countless maps can be made using different configurations of the information collected through interviews.

Example of a map showing condom availability at sites



Not only are maps useful for the intervention team, but they also are a powerful advocacy tool. A visual image of the sexual or drug injecting network in a city or district can help advocate for funding or policy change to affect HIV/AIDS prevention in a way that charts and text cannot.

This guide illustrates how to make the five types of maps suggested by PLACE:

1. Map of venues in the priority prevention area by type of venue
2. Map of venues by venue size (number of patrons) and type of venue
3. Map of venues by number of new sexual partnerships and type of venue
4. Map of venues showing links between venues
5. Map of venues with and without HIV prevention onsite, with size of dot reflecting number of new sexual partnerships at venue in past 4 weeks.

Steps in the map creation process – overview

1. **Determine who will use the maps, and for what purpose.** The first step in the creation of maps from PLACE data is to determine the purpose of the maps. Will the maps be used to inform the intervention team about the appropriate types of interventions? Or will they be used as advocacy pieces to present to policy-makers? Alternately, maps could be used for spatial analysis, including network analysis, analysis of service availability areas, and spatial statistics.

The purpose of the map will determine the type of map created. Maps showing simple point location and classification can easily be created from PLACE data using Google Earth for most countries. However, if more complex spatial analysis is required, data will need to be imported into specialized mapping software, such as ESRI's ArcGIS or QGIS.

ArcGIS is a suite of geographic information system (GIS) software products. A GIS is a system for working with maps and geographic information. More information on ArcGIS can be found on the ESRI website (<http://www.esri.com/>).

QGIS is an open source geographic information system that can be downloaded for free from the QGIS website (<http://www.qgis.org/>).

2. **Identify who will make the maps.** Locally available mapping capacity determines both how maps are made and whether it is possible to create digital maps, such as those shown in this manual. This person or organization should be identified during Step 1 of the PLACE protocol.

Finding someone with the skills to make digital maps is much easier since the advent of Google Earth. Anyone with familiarity with Microsoft Excel and basic personal computing should be able to construct a map of PLACE results using this manual and Google Earth.

However, finding someone with expertise in using GIS software is necessary for creating digital maps capable of more complicated spatial analysis. Local mapping specialists may be found in NGOs, engineering firms or universities, but often can be found in government offices such as a census or city planning office, or a government unit dedicated to geosurveys or spatial analysis. Mapping software packages that a mapping specialist might use for performing spatial analysis are Arcview, Arc Info, EpiMap, QGIS, or others. A mapping specialist should be consulted during Step 1 of the protocol to find out: 1) what types of maps of the PPA (or city or district where the PPA is located) exist; 2) the cost and electronic availability of these maps; and 3) the cost to produce maps identifying sites found in a PLACE assessment and to link sites with PLACE data.

3. **Collect spatial data.** Sites can either be placed on a map via geo-referencing (measuring their coordinates via GPS) or by hand using other landmarks on the base map to identify the correct

site location. This can be done at any point after the final list of verified sites is obtained in Step 3 of the PLACE protocol.

Measuring site coordinates is the preferred method for identifying sites on a base map since it provides accurate information about location and distance from other sites or landmarks. This is done using a hand-held, battery-operated device called a Global Positioning System (GPS) unit. GPS units are the size of a cellular telephone and can be used with a couple of hours of training and practice. These units utilize signals from satellites circling the earth to determine the location of a site with a high degree of accuracy. Coordinates are measured by standing outside of a site with a clear view of the sky while operating the GPS unit for 5 to 15 minutes. The result is a list of unique site numbers and their coordinates that can be entered into a database and given to the mapping specialist to use with mapping software to locate sites on a base map. To enhance the utility of the maps, landmarks such as schools, taxi stands and bus terminals, churches, police stations, health clinics and others should also be mapped with a GPS unit if they do not appear on the base map. *More details on the collection of spatial data can be found in on page 8.*

4. **Link sites on map to PLACE data.** Georeferenced sites on the map are linked via their unique site numbers to the database containing information collected at each site. This information will be used later to create informative maps displaying characteristics of each site. *More information on linking coordinates to PLACE data can be found on page 12.*
5. **Create maps.** Sites are plotted on the basemap with information relevant to the intervention team. Maps created could include maps displaying condom availability at each site or sites with HIV prevention activities. This step will differ depending on the mapping software used. If you are using Google Earth, follow the steps on page 12 of this guide. For plotting points on maps capable of more sophisticated spatial analysis, work with your mapping specialist. *More information on the creation of maps can be found on page 12 of this guide.*
6. **Publish maps.** Maps can then be published according to the audience type. The intervention team, and other people working in health, may find maps displaying the distribution of risk behaviors helpful. For other groups, other types of maps may be important. Because the PLACE method collects information about some illegal or stigmatizing behaviors, care should be taken when displaying this information on maps. It is recommended that maps that appear in documents that might be circulated to people not working in health, such as the police or other authorities, contain only non-sensitive information. Since maps, by nature, provide definitive clues for finding the places marked on them, some variables need extra consideration before including them in maps appearing in reports or other documents:
 - Where alcohol is sold illegally
 - Where sex workers solicit customers
 - Where injecting drug users can be found
 - Where men meet male sexual partners

Maps containing sensitive information may, however, be needed by the intervention team for program planning. Such maps should be provided, along with an explanation of the ethical issues involved in sharing the maps with others. *More information on map publication can be found on page 18 of this guide.*

Preparing your computer

If you have decided to represent your PLACE results using Google Earth, you will need to make sure you have both Microsoft Excel and Google Earth loaded on your computer. To do this, you will need the computer you plan to use to make your maps and an internet connection.

1. **Open Microsoft Excel.** Chances are that you already have Microsoft Excel installed on your computer. Take this opportunity to open the program, install any updates, and refresh your knowledge of this common software.
2. **Download Google Earth.** Google Earth software can be downloaded for free from the Google Earth website: <http://www.google.com/earth/index.html>.

Collecting spatial data

Spatial data can be recorded using any type of global positioning system (GPS) device. The term “spatial data” refers to the latitude and longitude measurements, or *coordinates*, that correspond to a venue in the PLACE assessment or another point of interest. Complete instructions on use of GPS devices can be found in the [MEASURE Evaluation Global Positioning System Toolkit](http://www.cpc.unc.edu/measure/tools/monitoring-evaluation-systems/global-positioning-system-toolkit.html) (<http://www.cpc.unc.edu/measure/tools/monitoring-evaluation-systems/global-positioning-system-toolkit.html>). Briefly, to collect spatial data, the data collection team should carry a GPS device with them during the venue verification visits in Step 3 of the PLACE protocol. Latitude and longitude should be recorded along with each venue’s ID number. Coordinates can be recorded either in the GPS unit or by hand. If coordinates are recorded in the GPS unit, the study team should be sure to upload the information on the study computer at the end of each day of data collection if possible.

In addition to recording the latitude and longitude of the venues, the study team may want to record spatial data on other locations of interest. These locations could include all places in a defined geographic area where health services are offered, condoms are available, or prevention activities take place. Unlike the PLACE venues, these other locations do not have other data associated with them. For this reason, it’s a good idea to record descriptive information with each point so that you remember what type of location it is.

Prepare for collection of spatial data

Prior to beginning to collect spatial data, the study coordinator should ensure that all necessary resources are available. A summary of suggested resources can be seen in the box below. Note that before training of GPS operators can begin, they will need to be identified. It would most likely be most

Suggested resources for collecting spatial data:

- ✓ GPS units (at least one per interview team)
- ✓ Trained GPS operators (at least one per interview team)
- ✓ Extra batteries for GPS units

efficient to enlist one interviewer per interview team to operate the GPS units. However, if not enough GPS units are available, the field coordinator will need to decide how spatial data will be collected prior to training the spatial data collectors.

Before data collection begins, the field coordinator should prepare the GPS devices. This procedure is very important to ensure that the data points are collected correctly:

- ✓ Initialize GPS units. If the receiver has not been turned on in the location before, or if it has been powered off for an extended period of time, the GPS receiver may need to be initialized. Refer to the documentation for the specific GPS device used in your study for specific instructions.
- ✓ Set up GPS units. Refer to the documentation for your GPS device to set the format for the spatial data (sometimes called the “location format”) to **decimal degrees**. This format may be represented “hddd.ddddd” in the GPS unit.
- ✓ Set the **map datum to WGS 84**.
- ✓ **Clear memory of old waypoints.** Delete any old waypoints that will not be used in this mapping project

NOTE: The most common source of errors in GPS datasets is incorrect specification of the location format in the GPS device. Be sure that you set the GPS device to record the spatial data in decimal degrees. If you prefer to use a different format for data collection, be sure to record which format you use. After data collection and before using this guide to make your maps, you will need to convert your coordinates to decimal degrees.

Train GPS operators

Before the training, the study coordinator should ensure all GPS units are charged and ready for use. Keep in mind that the collection of spatial data will likely coincide with PLACE Step 3, so training efforts could be coordinated with the training of interviewers for Step 3. The study coordinator should decide on a naming convention for your sites of interest. From PLACE Step 3, each venue should already have a Unique Venue Number. Other types of sites will not yet have an identifier, but could be assigned a number-letter combination to distinguish them from the venues, such as 1a, 2a, 3a, ... , etc.

Components of training

Training should begin with a discussion of the importance of mapping to the PLACE study. The field coordinator should emphasize the value that maps bring to the interpretation of PLACE results. Then, training should cover how the collection of spatial data will be integrated with PLACE Step 3 and how to use the GPS devices. This section should include venue naming conventions and how other sites (health centers, parks, etc) should be named in the GPS unit. The training should conclude with a description of how spatial data collected during this step will be exported and utilized.

Suggested Training Schedule:

- ✓ Welcome and purpose
- ✓ Presentation of maps from previous places studies
- ✓ Data collection process
- ✓ Fundamentals of GPS operation
- ✓ Saving and exporting spatial data
- ✓ Practice using GPS devices, recording coordinates, and downloading points with their unique venue numbers to computer
- ✓ Conclusion: How spatial data will be used in this project

Collect Data

Ideally, spatial data will be collected at the same time that venue verification takes place. Prior to the start of data collection, the field coordinator completes the following tasks:

- ✓ Gathers and charges all GPS units
- ✓ Configures all GPS units and clears old waypoints
- ✓ Ensures all GPS operators are trained
- ✓ Sets up database in which to download venue coordinates at the end of each data collection day

Visit venues. In PLACE Step 3, the field coordinator assigns each pair of interviewers a list of venues to verify. One interviewer from each interview team will act as the GPS operator during the venue visits. Upon arrival at the venue or other site, the GPS operator will power on the GPS and wait until the GPS unit has locked onto satellites.

Measure coordinates. The coordinates of the site are recorded using the GPS. Specific steps to measure coordinates can be found in the documentation for the specific GPS device used by the study team. In general terms, coordinates are measured outside of the venue with a clear view of the sky. Total time spent operating the GPS unit will vary between 5 and 15 minutes per site.

Coordinates for all venues verified to exist in Step 3 should be measured and included on the base map, including those where no interview with a venue representative was possible and those located outside the PPA boundaries but within a reasonable distance. In addition, interviewers should record other points of interest in each area, such as the location of health centers.

Label points. All venues should already have a Unique Venue Number for use during venue verification. This number should be recorded for all venues in the GPS device along with that venue's coordinates. Other sites (health centers, clinics, etc) will not have a pre-existing identifying number. These sites should be labeled descriptively in the GPS unit so that the data analyst will know how to map the site. For example, a hospital might be labeled "Town X Main Hospital," or with the name of the hospital.

Download coordinates into study database

At the end of each day, the coordinates from the venues visited that day should be downloaded into the study database. The GPS unit should have come with software to extract the coordinates. Refer to the manual for the GPS units to find instructions on how to download points. Be sure points are downloaded in decimal degrees format.

Mapping sites and linking maps to PLACE data

Using data from PLACE Step 3, the spatial data collected in the above steps, and the PLACE Google Earth Mapping Tool, you can easily create three types of maps. A brief overview of each type of map is provided below.

Map 1: Venues, condoms, and prevention activities

This map shows the location of PLACE venues in relation to other sites (such as health facilities) and the availability of condoms and prevention activities. It includes the following components:

Layer 1: PLACE Venues

Layer 2: Other sites

Layer 3 (Optional): Condom availability

Layer 4 (Optional): Prevention services

Map 2: Venues by venue type

This map shows the location of PLACE venues by venue type in relation to other sites (such as health facilities). Venues have been grouped into four types, including “Eating/Drinking/Dancing/Sleeping” places, “Transportation/Public/Commercial” areas, “Hidden/Private/Abandoned” areas, and “Events,” and each type is represented by a different color.

Layer 1: PLACE Venues by type

Layer 2: Other sites

Map 3: Venues by venue size and type

This map shows the location of PLACE venues by venue type and size in relation to other sites (such as health facilities). Venue types include “Eating/Drinking/Dancing/Sleeping” places, “Transportation/Public/Commercial” areas, “Hidden/Private/Abandoned” areas, and “Events,” and each type is represented by a different color. Venue size was calculated by the estimated number of patrons at the venue during its busiest hours. Venues were divided into four categories based on the number of patrons: 50 or fewer, 51 – 250, 251 – 500, and over 500.

Layer 1: PLACE Venues by type and size

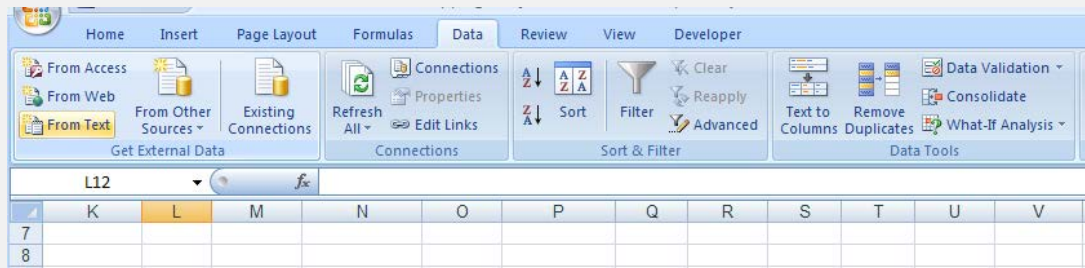
Layer 2: Other sites

From PLACE step three, a consolidated venue list with updated names and addresses from venue verification should already exist. This list is referred to as “List 2” in the PLACE manual. Sort this list by the Unique Venue Number.

Many project teams will already have venue coordinates entered into the PLACE form C database. If this is the case, **make a copy of the form C database, and skip to “Organizing GIS data – Part 2.”** Data downloaded from GPS devices should have a column for the site ID (either the Unique Venue Number or description of other site) and location coordinates. The next section describes how to organize this information before mapping begins.

Organizing GPS data – Part 1 (no coordinates in database)

1. **Import data points.** If your spatial data are currently in a text document, follow these instructions to import your data to MS Excel. **If your data are already in spreadsheet form, you can skip this step.**
 - a. Save the text file containing your data points on your computer.
 - b. Begin on the worksheet labeled “Import Data.”
 - c. Click on the “Data” tab on the MS Excel menu and select “From Text” in the “Get External Data” section.



- d. Choose “Delimited” and click the “Next” button.
 - e. Check the boxes next to “Tab” and “Space.” Click “Next” and then “Finish.”
2. **Organize data points.** In your dataset from the GPS unit, you should have two critical pieces of information: either the Unique Venue Number or the site description and the location coordinates in decimal degrees.
 - a. First clean up the dataset, ensuring that all columns are aligned
 - b. Now open the Form C database from PLACE step 3. Create columns for Latitude and Longitude, if they do not already exist. If the columns already exist and are populated with spatial data, go to “Organizing GIS data – Step 2” (below).
 - c. Match the Unique Venue Numbers in the spatial dataset with those from the Form C database (by sorting the column?). Insert the latitude and longitude from the spatial database into the latitude and longitude columns in the form C database corresponding to each venue.
 - d. Save the Form C database.

Organizing GPS data – Part 2 (coordinates already in database)

3. **Create customized mapping dataset.** If spatial data are currently in the PLACE form C database, minimal preparation is required.
 - a. Create a new dataset consisting of only the venues with spatial data. *Be sure not to delete information from your original dataset!*
 - i. In statistical software packages, this can be accomplished by creating a new dataset from the original database where the latitude and longitude variables are not missing. Export this new dataset to Microsoft Excel.
 - ii. In Microsoft Excel, make a copy of the datasheet and then delete any records missing information on latitude or longitude.
 - iii. Save this dataset as the “Mapping dataset.” This dataset will be referred to as the “Mapping Dataset” from this step forward.
4. **Add extra spatial information.** If you have collected extra information on non-Venue sites, such as health facilities, locations where condoms are distributed or sites where prevention activities take place, add these to the end of the dataset.
 - a. **Create a new record for each site.** For each site, enter a unique identifier in the Unique Venue Number column (C2), the site coordinates in columns associated with C12, the site name in column C11, and make a new column to record what type of site it is (ie, health facility, condoms distributed, etc).
5. **Ensure all records in the dataset have values for both latitude and longitude.**
 - a. If a venue or site is missing spatial information, delete the record.
6. **Save the Mapping Dataset.**

Mapping PLACE venues and other sites

Venue data from the PLACE assessment should be organized in a modified copy of the Form C database, known as the Mapping Dataset, with each venue on one line and extra sites added in additional rows. Venues should already have a Unique Venue Number from PLACE Step 3.

If you have access to the internet, you can use the PLACE Google Earth Mapping Tool (PGEMT) to display the venues and other sites in Google Earth.

Before you get started, open the PGEMT file in Microsoft Excel. **Enable macros.**

7. **Convert coordinates to decimal degrees.** If your coordinates are already in decimal degrees, you can skip to part b. To begin mapping these sites, geographic coordinates will need to be in a format called *decimal degrees*. Your GPS device most likely exports the data points into either UTM or decimal degrees format (although degrees/minutes/seconds and degrees/decimal minutes are also possible formats).

- a. **UTM:** If your data are in UTM format, they may look like this

12 1735035.0 807250

Where 12 is the zone number, 1735035.0 is the longitude and 807250 is the latitude.

- If your spatial data are in this format, open the PGEMT workbook and click on the tab labeled, "Start here!"
- Fill in the SiteID numbers from column C2 of the Mapping Dataset.
- Indicate whether each site is in the northern (N) or southern (S) hemisphere by typing N or S in the column labeled "North or South?"
- Input the zone number, longitude, and latitude of each site based on the Mapping Dataset.
 - If you do not know the zone number, ask a mapping specialist or search on the internet for "UTM" and the name of the country where the venues are located.
- No sites should have missing spatial information.
- If you want to start over at any time, click on the "reset" button
- When all data have been entered, click the "Coordinates Entered" button.

	A	B	C	D	E	F	G	H	I	J
1	VenueID	North or South?	Zone	Longitude	Latitude					
2	282	S	33	1324453	882658					
3	182	S	33	1320686	886524					
4	270	S	33	1321037	888940					
5	131	S	33	1321620	886000					
6	87	S	33	1321107	886550					
7	1	S	33	1321722	886162					
8	158	S	33	1320313	886601					
9	16	S	33	1321873	885582					
10	154	S	33	1320620	885688					
11	155	S	33	1318718	890066					
12	17	S	33	1322056	885598					
13	14	S	33	1322076	885638					
14	8	S	33	1322164	885820					
15	157	S	33	1320100	886663					
16	251	S	33	1321554	885024					
17	3	S	33	1321969	885473					
18	252	S	33	1320569	886146					
19	128	S	33	1321735	885823					

- b. **Decimal degrees:** If the data are in decimal degrees format they may look like this

-83.85661983 14.08371429

Where -83.85661983 is the longitude and 14.08371429 is the latitude, in this example.

- i. If your data are in this format, open the PGEMT and select the tab labeled “Data_Entry”
- ii. Fill in the SiteID numbers as well as Longitude and Latitude for each point based on the values in the Mapping Dataset.

8. Enter data

- a. Regardless of which data type you entered, **click on the “Data_Entry” tab**. The worksheet should now look like something like the image below.

	A	B	C	D	E	F	G	H	I	J
1	Name	Longitude	Latitude	Description	Type	numType	ID	Condoms	Condoms	Descr
2	SHA5001	-84.15416018	14.13960592							
3	SHA5006	-84.15326264	14.13958621							
4	SHA5011	-84.14977222	14.13893047							
5	SHB3002	-84.15431634	14.14118838							
6	SHB3005	-84.1434718	14.13057304							
7	SHB3008	-84.14021562	14.1289626							
8	SHB3013	-84.14473301	14.13037132							
9	SHB5-ESCUELA	-84.14886494	14.13746551							
10	SHB6012	-84.15305826	14.139647							
11	SHB6013	-84.15373557	14.14100083							
12	SHB6014	-84.15475601	14.14081427							
13	SHB6015	-84.15388128	14.14119223							
14	SHB6021	-84.15512315	14.1410625							
15	SHC9006	-84.15466044	14.14105699							
16	SHD3004	-84.15454804	14.14116404							

- b. The Unique Venue ID will populate automatically from the “Start here!” tab if you entered your data using that tab. However, the ID is preserved elsewhere in the data sheet, so the Name column can be changed to the actual name of the site or venue, if desired.
- c. **Description:** Write a brief description of each point, such as the name of the venue or other site listed. This information can be found in the Mapping Dataset created in the section above in column C11.
- d. **Type:** Indicate the type of point listed in each row. Options for “type” include “venue,” “health facility,” and “condoms.” All records will be “Venues” unless other site types were added in “Organizing GIS data – Part 2” above. If the site type is not available in the list of options for site type, select “other.”
- e. **Condoms:** In the condoms column, indicate if condoms are available at the site. If you entered “condoms” in the “type” column, no additional indication is necessary here. If information on condom availability was collected in the Form C database, this information can be transcribed directly to the “Condoms” column of the spreadsheet. In this column, enter 1 if condoms were available, 0 if not.
- f. **Prevention activities:** In the prevention activities column, indicate if the venue offers any sort of HIV prevention activities. Like the condom column, 1 indicates that prevention activities have occurred, and 0 indicates that no prevention activities have occurred.

- g. **Venue Type:** The venue type column is the data in column C13 from the Mapping Dataset if the question numbering was consistent with the PLACE manual. Enter the code recorded for C13 in this column.
- h. **Venue Size:** The venue size column is the data in column C27 from the Mapping Dataset. Enter the code recorded for C27 in this column.
- i. **Number of new partnerships:** The number of new partnerships column can be completed with data from Form D of the PLACE protocol. The statistical software package of your choice can be used to calculate the sum of all the new partnerships at the venue with the Form D data.
- j. **Gender ratio:** The gender ratio can be computed from the Form D data in the statistical software package of your choice. If you do not have the Form D data at the time that the maps are being made, the columns for Number of new partnerships and Gender ratio can be left blank
- k. Note that in this step, you are only entering information in the green columns.
- l. Click the **Data Entry Complete** button.

9. Customize your maps

- a. Click on the “Customization” tab.
- b. Select the colors you would like each type of site to appear on your map

10. Name and chose file path for your maps

- a. Click on the “File_Details” tab.
- b. Edit the filepath where you wish to save your maps. The first (left-most) column refers to the basic site map, and the second column refers to the map of condom availability.
 - i. Example filepath: c:\sites.kml
- c. Edit the Document Name for each map, if desired.
- d. Do not change anything else on this worksheet

11. Create the maps

- a. Map of sites by site type
 - i. Click the Map Venues by Type button.
 - ii. On your computer, navigate to the folder where the file was saved (the c:\ drive in the example above) and double click on the file name (venuesbytype.kml).
 - iii. Google Earth will open, and the sites you visited will appear on the map. Note that only venues and health facilities appear on this map.
 - iv. If sites appear to be in the wrong location, check the format of the coordinates
- b. Map of condom availability
 - i. Click the “Map Condoms” button.
 - ii. On your computer, navigate to the folder where the file was saved (the c:\ drive in the example above) and double click on the file name (condoms.kml).
 - iii. Now, the sites where you indicated condoms were available will appear on the map, in addition to the points added in the previous step. Venues and health facilities that have condoms available will now have an extra layer denoting condom availability, and other sites distributing condoms will appear on the map as triangles.

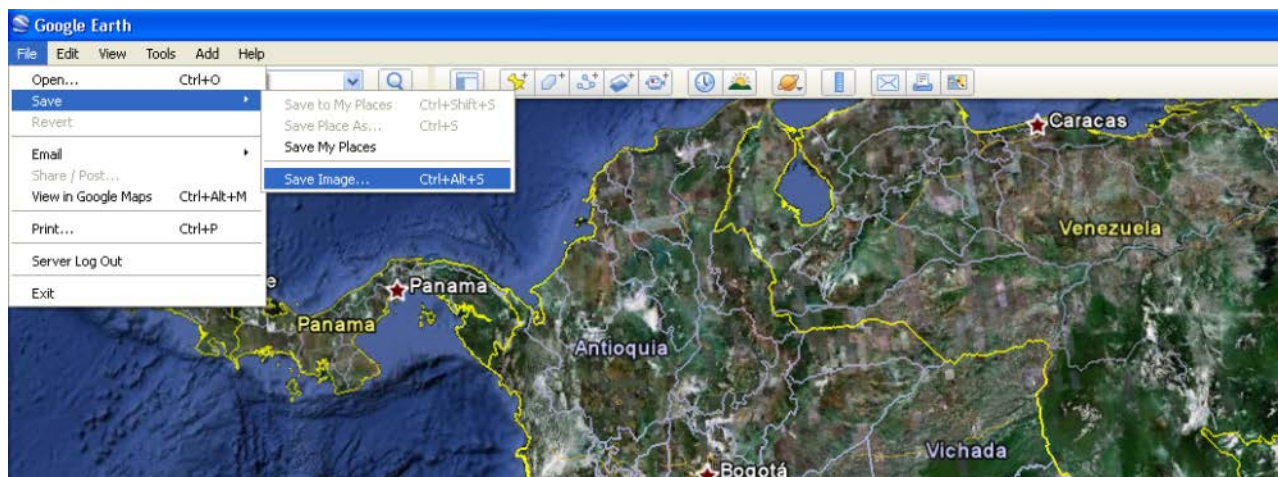
- iv. If sites appear to be in the wrong location, check the format of the coordinates

12. Manipulate the maps

- a. After both maps are loaded into Google Earth, they will appear in the Temporary Places folder on the left sidebar.
- b. Toggle between the maps
 - i. Each map can be “turned off” and “turned on” by clicking on the checkbox beside the map name in the temporary places folder
- c. More refined changes can be made to your maps by right-clicking on each point to open its “properties” dialog box. Descriptions and point styles may be edited, latitude/longitude coordinates may be changed, or alternatively the point itself may be dragged to a new location.
- d. If you make edits to your points (location or other information) you will need to save the changes to avoid losing them upon exiting Google Earth. To do this you may either choose File>Save>Save Place As. . ., or right-click the name of the KML file in the Places sidebar and choose Save Place As. You may keep the same name to replace the old information with the new, or you may create a new KML file with a different name.

Publishing Maps

After maps have been generated in Google Earth, they can be exported as images for use in reports and presentations. To save images with mapped KML information from Google Earth, navigate to File → Save → Save Image. From here, you can save the image as a JPEG file and use it presentations and reports.



Size Estimation

Estimating the size of specific populations at risk for HIV can be helpful in understanding disease transmission and designing prevention programs. Two methods for estimating the size of at-risk populations are described in this guide. The first method provides a rough estimation based on the number of individuals at each venue and the venue-specific weights. The second method provides a more refined, though more difficult to ascertain method that takes into account how frequently each of the interviewed subjects attends the venue in question as well as the venue weights. Selecting the appropriate size estimation method depends on how the estimates will be used, as well as the necessary level of precision.

Determining venue weights

If all venues in the PPA are visited during the PLACE study, each venue receives a weight of 1. However, it is often necessary to sample venues from the total population of venues due to logistical constraints. For example, although 400 venues may have been identified by community informants, it may only be possible to visit 40 venues over the course of the study. In this case, it is necessary to select and weight each venue so that the selected venues represent the entire population of venues in the PPA. The weight assigned to each venue is the inverse of its probability of selection. In the example above, if the 40 venues were selected randomly from the 400 venues in the PPA, the probability of selection for each venue would be 0.1. Note that in this example, all venues had the same probability of selection. Therefore, the weight for all selected venues would be $1/0.1 = 10$.

Size estimation technique 1: venue-based estimates

Population size can be roughly estimated through venue-level information. Form C of the PLACE protocol provides an estimate of the number of individuals attending the venue at its busiest times. A simple size estimate can be constructed by multiplying this number by the venue weight for each venue, and then adding the weighted count across venues.

Size estimation technique 2: estimates based on individual-level data

The size of populations of interest can also be estimated using individual-level data on the number of times in a given interval that that individual attends the venue where they were recruited into the study. For example, the number of unique sex workers attending a particular venue over the course of one month can be estimated using the number of individuals attending the venue with each level of frequency. The steps to perform this estimation method are outlined below:

1. Define categories of frequency of attendance. For example, if the time frame of interest is one month, these categories may include the following
 - a. Everyday
 - b. 4 – 6 times per week
 - c. 2 – 3 times per week
 - d. 1 time per week
 - e. 2 – 3 times per month

- f. 1 time per month
 - g. Less than one time per month
 - h. First time at venue
2. Count number of respondents of interest in attending the venue with each level of frequency.
3. Multiply the number of respondents in each category by the venue weight.
4. Sum the weighted counts across venues. This can be accomplished easily using statistical software packages, such as PROC SURVEYFREQ in SAS.
5. Determine the number of busy days in the specified time period. For example, imagine that a venue was only busy on Friday and Saturday nights. The number of busy days in one month would then be 8.
6. Determine the number of busy days in the time period that a person in each category would be likely to attend. For example, if someone attended the venue one time per week, he or she would be at the venue 4 times over the course of the month.
7. Calculate the multiplier for each category by dividing the number of busy days at the venue by the number of venue days likely to be attended by someone in that category
8. Estimate the total population by multiplying the count for each category by the multiplier calculated above. Add weighted counts.

	A	B	C	D	E	F
1	Attendance	Count	Busy days at venue	Busy days attended	Multiplier	Weighted estimate
2	Everyday	281	8	8	C2/D2	B2*E2
3	4-6 times	188	8	8	1	188
4	2-3 times	175	8	8	1	175
5	1 time/wk	155	8	4	2	310
6	2-3 times/m	133	8	2.5	3.2	425.6
7	1 time/mon	106	8	1	8	848
8	< 1 month	237	8	0.8	10	2370
9	first time	109	8	1	8	872
10	Total	1384				5188.6
11						
12						

9. If information was collected on whether or not each individual also frequented a different venue, this can be used to adjust the population size estimate. To do this, follow the steps below.
 - a. Multiply the number of individuals at each site who say that they also attend a different venue by the weight of the venue where they were interviewed.
 - b. Sum the weighted count of individuals frequenting more than one venue across venues.
 - c. Divide this number by 2.
 - d. Subtract the final number from the weighted estimated obtained in step 8 above.

Appendix A: Quick start guide

Quick start guide – *Using the PLACE Google Earth Mapping Tool*

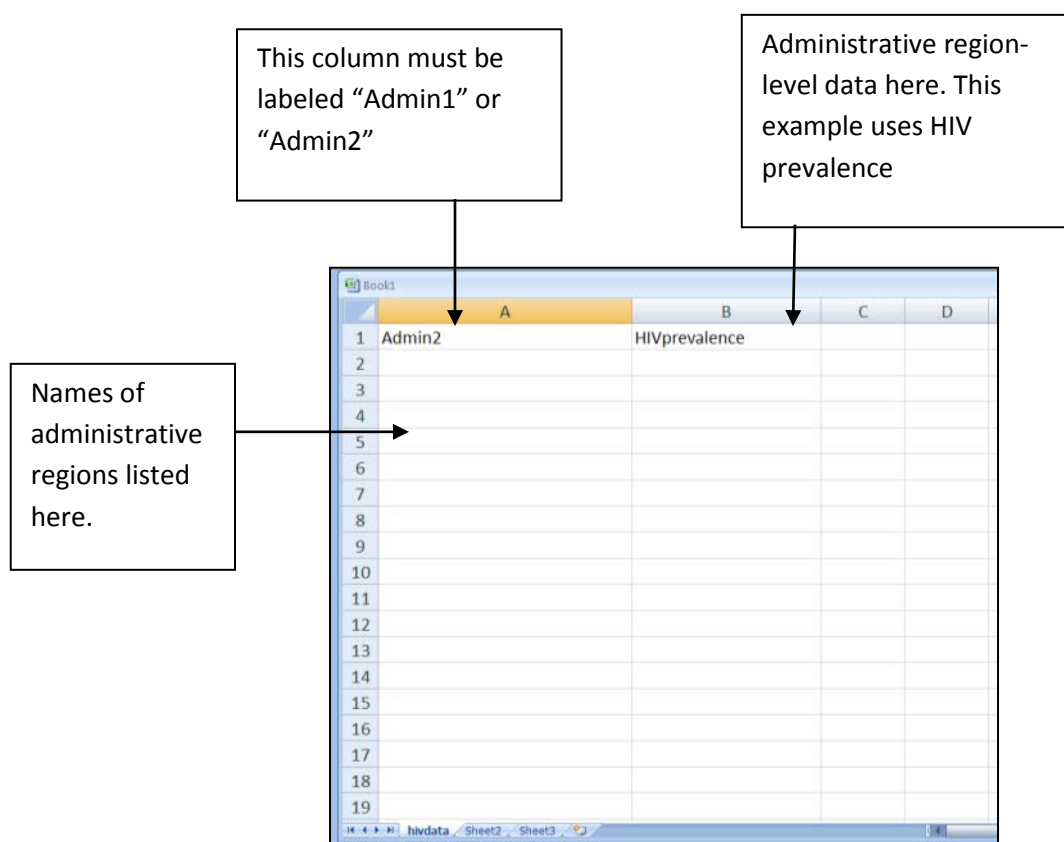
1. **Install Google Earth.** <http://www.google.com/earth/index.html>
2. **Open the PLACE Google Earth Mapping Tool.**
3. **Enable macros.**
4. **Enter data.** Use Data_Entry tab to enter venue-level data from PLACE Form C and Form D. If coordinates are not in *decimal degrees*, see the instructions to “convert coordinates to decimal degrees” in the main guide.
5. **Delete records with no geographic data.** If a venue is missing latitude and/or longitude measurements, delete the entire record from the Data_entry tab.
6. **Click “Data Entry Complete” button.** The button is on the far right of the data entry table.
7. **Customize maps.** Open the “Customization” tab and change colors as desired.
8. **Create the maps.** Open “File_Details” tab, and click buttons to create appropriate maps.
9. **Open maps in Google Earth.** Navigate to folder where files were created, double click file to open.

Appendix B: Administrative region-level mapping

Administrative region-level data

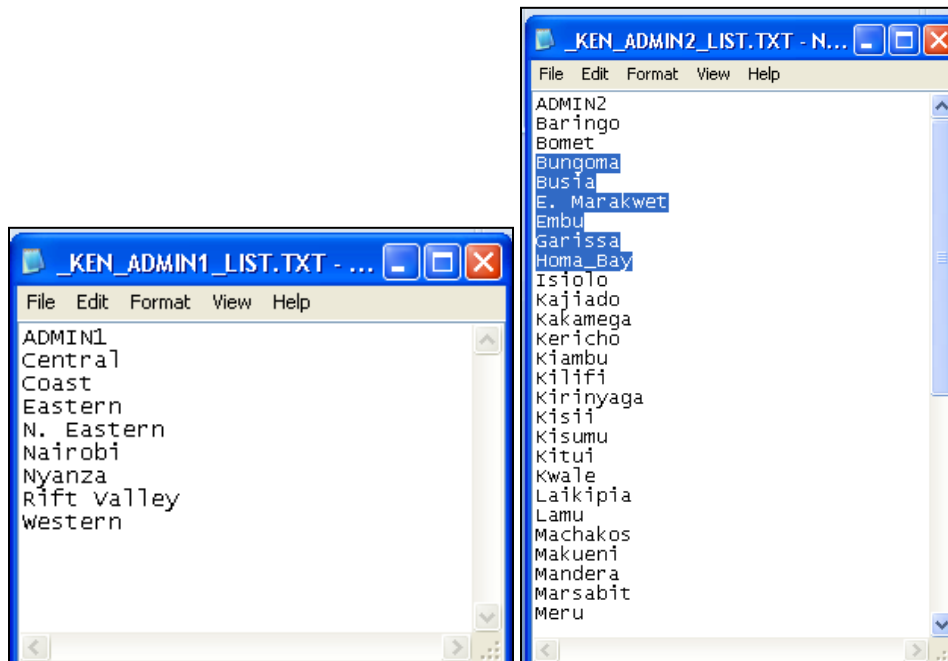
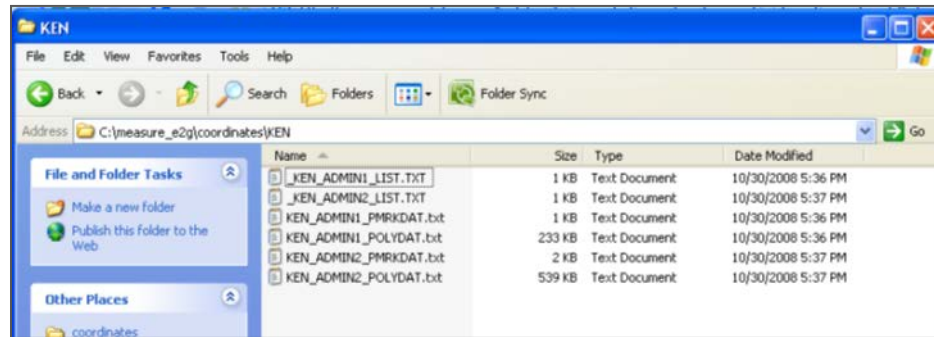
We will start with the polygon (administrative region-level) data. If your project takes place in one of the 40 PEPFAR countries, the MEASURE evaluation offers an easy tool to convert your data into the type of file required by Google Earth.

1. **Download the *Excel to Google Earth* tool.** This tool can be downloaded from the MEASURE Evaluation website (www.cpc.unc.edu/measure/e2g). The default version includes available administrative boundaries for all 40 countries. Alternatively you may choose to download boundary data for only your country.
2. **Set up your data.** After you download the program, you can begin to set up your data. This tool requires your data to be set up in Microsoft Excel as seen below.



3. **Make sure administrative region names match.** After your data is in the format above, it is important to make sure the names of the administrative regions in your file exactly match the names of the administrative regions in the *Excel to Google Earth* tool. To do this, open the installed folder containing *Excel to Google Earth* on your computer. It should be titled

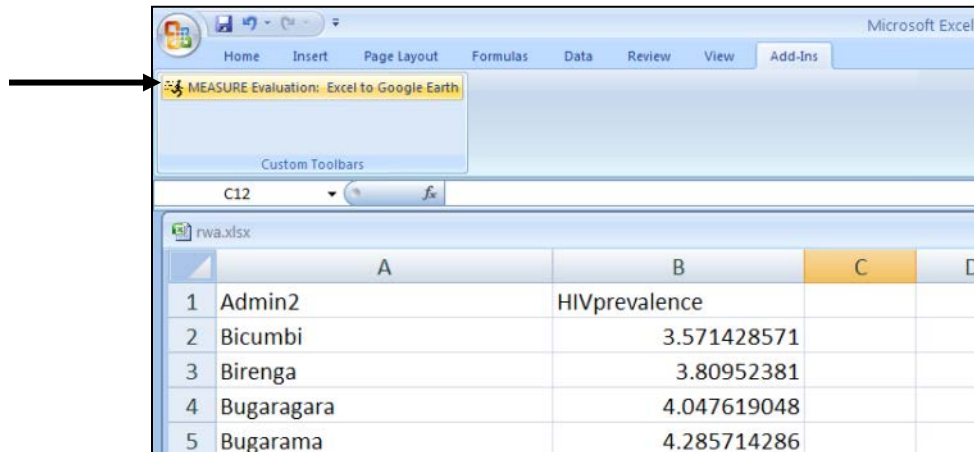
“measure_e2g.” Double click on the folder labeled “coordinates,” and select your country from the list. The first two files in each folder represent the administrative regions for that country. For example, in the screenshot below, the first two files contain the administrative regions. The first file, “_KEN_ADMIN1_LIST.TXT” contains high-level (province-level) administrative names, as shown below. The second file contains the names of the districts within Kenya.



Now make sure that the names of the administrative regions listed in your file match the names of the regions in the *Excel to Google Earth* lists. (If you are creating a new data file, you can import these text files directly into a new blank Excel worksheet and enter your data into a new column there.)

4. **Run the *Excel to Google Earth* macro.** Once the administrative name lists match, go back to the measure_e2g folder and click on the folder titled “macro.” Click on “measure_e2g.xls” to run the macro, and be sure to enable macros in Microsoft Excel.

After installing and enabling the macro, click on the button labeled “Measure Evaluation: Excel to Google Earth” that appears on your Microsoft Excel toolbar, as illustrated below.



Follow the instructions on the screen to complete your map. If you have questions or need further assistance, refer to the *Excel to Google Earth* tutorials and frequently asked questions (FAQs) listed below.

- **Tutorial:** <http://www.cpc.unc.edu/measure/tools/monitoring-evaluation-systems/geographic-information-systems/e2g-tutorial>
- **FAQs:** <http://www.cpc.unc.edu/measure/tools/monitoring-evaluation-systems/geographic-information-systems/e2g-faq>