OVC Mapping Reference Document

MEASURE Evaluation
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Improving Data Use to Support Orphans and Vulnerable Children

The issues surrounding OVC are complex and cross-cut many sectors. Decisions about OVC programs should rely on robust and multi-faceted data. Better informed decisions can be made when supported by the whole data infrastructure available for OVC programs. Geographic Information Systems (GIS) can assist better informed decisions by organizing data and producing maps as decision support tools. By maximizing the value of the data infrastructure, better outcomes for OVC are possible.

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Abstract

There are an estimated 18 million children worldwide orphaned due to HIV/AIDS, with 12 million in Sub-Saharan Africa. By 2010, an estimated 20 million children will be orphaned, with an additional 40 million children vulnerable to losing their parents to HIV/AIDS. Additionally there are many more children facing circumstances that threaten their growth and development making them vulnerable to increased poverty, poor health, malnutrition and diseases such as HIV/AIDS. Through the Presidential Emergency Plan for AIDS Relief (PEPFAR) and other programs, the United States provides funding for programs that address the needs of children in such dire circumstances.

The OVC Mapping Activity was designed to assist PEPFAR programs to expand and enhance the provision of services for children most in need by improving the use of available data. Additionally, the OVC Mapping Activity provides guidance on how data and geographic mapping can be used to better support decision makers and program planners to allocate resources effectively and efficiently.

This document provides an overview of the OVC Mapping Activity as well as the findings and recommendations on ways data can be used to support orphans and vulnerable children (OVC) program decisions. It presents ways to organize data and use mapping to evaluate the coverage and organization of OVC programs and services. The reference document is intended to provide direction on maximizing the available data infrastructure that can support OVC programs and the use of GIS mapping as a decision support tool for PEPFAR staff and national governments concerned with OVC programming.

TABLE OF CONTENTS

EXECUTIVE SUMMARY

This document provides the results of the OVC Mapping Activity carried out from March 2007 through September 2008. The purpose of the activity was to conduct an evaluation of the data available to USG/PEPFAR teams to support OVC program decision making and if possible, produce maps that would serve as decision support tools. Twelve PEPFAR focus countries participated in the activity: Côte d'Ivoire, Nigeria, Haiti, Vietnam, Ethiopia, Uganda, Tanzania, Rwanda, Namibia, Botswana, Zambia and Mozambique. The PEPFAR SI liaison, OVC focal person and USAID PEPFAR lead from each country were interviewed about OVC program decision making and the data available to support their decisions. After the interview, the identified OVC data was requested. The submitted data was then evaluated to determine whether it could be mapped. When mapable, GIS was used to produce maps were at a scale and detail supported by the data. The findings from the two stages: Interviews and Data Evaluations are presented below.

FINDINGS FROM THE USG TEAM INTERVIEWS

USG teams were interviewed and asked about the types of decisions that were made, how those decisions were made and what data were available to support the decisions. USG teams were also asked about what additional data, not currently available, might be useful for decision making, as well as how mapping had been or could be used as a decision support tool. This context of data demand and information use (DDIU) will provide insight into the relationship between the data and the decisions being made.

While the specifics varied from country to country, consistent themes emerged from the interviews:

- USG teams felt the available OVC data was insufficient to support decision making. Problems such as double counting of children receiving services, incomplete data and inadequate data reporting efforts were identified.
- Data was fractured and not maintained by one entity. Tracking down the different sources of data, obtaining and utilizing it was a difficult task for an already over-burdened team.
- Teams recognized the need for data sharing within USG and among OVC actors in the country.
- Maps were seen as being a potentially valuable decision support tool, though some countries were unsure if the capacity to produce maps existed within the national government or among other OVC actors.

FINDINGS FROM THE DATA EVALUATION

The data sent by the USG teams represented the data that was readily accessible and had been used or was available to support the decision making process. A comprehensive evaluation of ***all*** available OVC data in a country was not carried out. Additionally, the data was not evaluated in terms of its completeness, accuracy or adequacy for OVC decision making, the data was evaluated to determine if it could be mapped and whether it conformed to data schema[1] best practice. The mapability of the data served as a proxy to illustrate how available data was to support decision making and whether it could easily be used.

Again the specific strengths and weaknesses of the data varied from country to country, however there were issues that were commonly observed:

- Most data sent was not mappable without additional work to clean or reformat the data.
- Roughly a third of the countries provided data that could not be mapped because no geographic identifier was provided with the data.

GENERAL FINDINGS

The following are general findings from the activity:

- Issues associated with OVC are complex and require data beyond the OVC domain to gain a full understanding of the issues. In other words, program decision-makers should take advantage of the full data infrastructure. In the context of PEPFAR, other segments of a country's HIV response can be helpful in design and decisions for OVC programming. Additionally, demographic, economic, food security, and humanitarian relief efforts, are other examples of data that can be helpful with OVC program decision making.
- OVC data should flow from bottom to top and back down again. Data reported at the local or community level should inform decision making at the national level and data should be available at the local level after it has been aggregated and analyzed at the national level.

RECOMMENDATIONS

INCLUDE GEOGRAPHIC IDENTIFIERS IN OVC DATA

- Geographic identifiers can be names of administrative units, villages, community or geographic positioning system (GPS) coordinates. Geographic identifiers

[1] Data schema refers to the way the data is organized and structured in a database.

should be associated with data on the services provided, clients or any other OVC related programs. Data reporting forms and data files created from the reporting forms should include these identifiers.

ENSURE OVC DATA FILES CONFORM TO DATA SCHEMA BEST PRACTICE STANDARDS

- Data is of little value if it can't be used. Organization of data in electronic files that permit querying, analysis and reporting is important and the backbone of maximizing data use in program decision making. OVC data should be stored, maintained and updated in software that is designed to store, manipulate and facilitate reporting of data such as spreadsheet programs or database programs. Word processing programs are not suitable for storing OVC data and should only be used for producing reports and other outputs. When data is stored in a spreadsheet program it should be structured so that there is one record per row and one data value per cell.

SHARE OVC DATA AMONG OVC ACTORS WITHIN A COUNTRY.

- USG teams should build data sharing networks with other donors, relevant national government agencies, implementing partners and others. Sharing data reduces the risk of duplication of effort, increases the complement and leveraging of PEPFAR interventions, reduces gaps in coverage, and provides additional information to support program decision-making processes.

PLAN FOR INTEGRATION OF DATA DURING DATA COLLECTION

- Data collection efforts should recognize the value of linking the data with other data sets that may exist. By including a geographic identifier and using standard codes that may exist (such as for health facilities) it can be much easier to integrate the data with other parts of a country's data infrastructure.

INCLUDE THE FULL DATA INFRASTRUCTURE OF THE COUNTRY IN THE OVC DECISION MAKING PROCESS

- Decision makers should consider data from other sectors/program areas such as economic, census, agricultural, education, humanitarian relief efforts when making OVC program decisions. Data from these domains provide valuable contextual information that can assist decision makers.

USE MAPPING PROGRAMS TO PRODUCE DECISION SUPPORT TOOLS AND TO FACILITATE DATA LINKING AND SHARING.

- Mapping programs including sophisticated GIS can produce valuable decision support tools that can identify patterns of services provided and populations in need. These decision support tools can complement existing tools and should be considered one of tools in the decision maker's toolbox. Additionally, GIS can

facilitate linking data from across the data infrastructure by using geography as the common link across data sets.

- New mapping software options make it easier to display data geographically.

Evidence based decision-making helps to improve the expansion of OVC care and support programs. High quality data supports strong evidence based-decision making. Leveraging data from other sectors helps to build a stronger data infrastructure. A maturing data infrastructure supports program sustainability and leverages PEPFAR program investment.

INTRODUCTION

INTRODUCTION

This document, the ***OVC Mapping Reference Document*** is the result of the OVC Mapping Activity conducted by MEASURE Evaluation during 2007 and 2008. Twelve countries participated in the activity. The purpose of the activity was to learn about the OVC decision making process and evaluate the available OVC data and determine whether it could be mapped. An additional objective of the activity was to produce guidance for the creation of maps as decision support tools for OVC program decisions.

This document is divided into 4 sections and 5 Annexes:

- **Overview of OVC Mapping Activity** – provides an overview of the activity, participating countries, activity objectives and results.
- **Data Demand and Information Use Strategy for OVC** – one of the findings of the OVC Mapping Activity was the need to make sure that OVC data was available to support OVC program decision making and OVC program decision makers used data. This section describes a data demand and information use strategy (DDIU) for OVC program decision support.
- **Using Geography and Spatial Tools to Integrate OVC Data** – The use of mapping can accomplish two tasks: produce decision support tools and facilitate linkages between data sets. This section describes how mapping and other spatial tools can support OVC program decision making.
- **Recommendations of OVC Mapping Activity** – This section outlines the recommendations from the OVC Mapping Activity.
- **Annex A: OVC Data Flow** – A robust data infrastructure is necessary to support OVC program decisions. The data in data infrastructure should be leveraged to support decision making at all levels. This section describes the value of having well defined, data collection processes for OVC program data to ensure that OVC M&E data and activities support decisions.
- **Annex B: Example of how GIS can integrate data to support OVC program decision making.** This section presents maps of data from Nigeria to show how spatial tools can produce decision support tools, and link data from multiple sources
- **Annex C: Case Study: Using Google Earth to Locate Service Sites** – This section provides an overview of an approach used by the PEPFAR team in Côte d'Ivoire to locate OVC and other PEPFAR service sites.
- **Annex D: Making Data Suitable for Mapping** – Before data can be mapped, it must be stored in a structure that permits mapping. This section describes the proper data schema to ensure data can be mapped.
- **Annex E: Proper GIS Data Schema** – Overview of the proper data schema for GIS

- **Resources and Works Cited**– This section contains a list of resources and works cited.

Note about Terms Used in Document

OVC

Strictly speaking, OVC stands for ***Orphans and Vulnerable Children***. However in some countries, programs differentiate between orphans (children who have lost one or more parent or caregiver) and vulnerable children. Likewise, some countries differentiate between children who have become orphaned as a result of HIV/AIDS and other orphans. This document adheres to the PEPFAR definition of OVC, however the concepts and findings are applicable to any definition of OVC.

Mapping

The term "mapping" can have multiple, and contradictory meanings. The word can be used to mean displaying data geographically and the word can be used to mean delineating information or situations in a non-geographic manner. When the word "mapping" is used in this document it refers to geographic mapping.

OVC MAPPING ACTIVITY OVERVIEW

OVC Mapping Activity Overview

The challenges inherent in using data to support OVC program decision making led to the OVC Mapping activity. The goals of the activity were:

1. Strengthen PEPFAR OVC activities by providing an effective replicable approach to mapping OVC program and other data related to the conditions of children and available services. Improved decision making would result in more effective allocation of resources and result in measurably improved well being of children.
2. Produce a guidance document for mapping data related to OVC programs to empower USG teams and partners to produce maps of OVC services and populations
3. Strengthen data infrastructure for OVC activities and encourage the use of standardized, high quality data to support OVC program mapping
4. Produce maps of services and/or populations at a scale and detail supported by the provided OVC data

In the fall of 2006, an email was sent by OGAC asking countries about their interest in mapping to support OVC program decisions. Based on the responses to the emails, twelve countries were selected for participation in the OVC Mapping Activity. The twelve countries were: Cote d'Ivoire, Nigeria, Ethiopia, Uganda, Rwanda, Tanzania, Zambia, Mozambique, Botswana, Namibia, Haiti, Vietnam.

MEASURE Evaluation implemented the OVC Mapping Activity and developed maps for countries.

Activity Flow Chart

There were three distinct phases for the OVC Mapping Activity. These three phases are presented in Figure 2 and described in detail below.

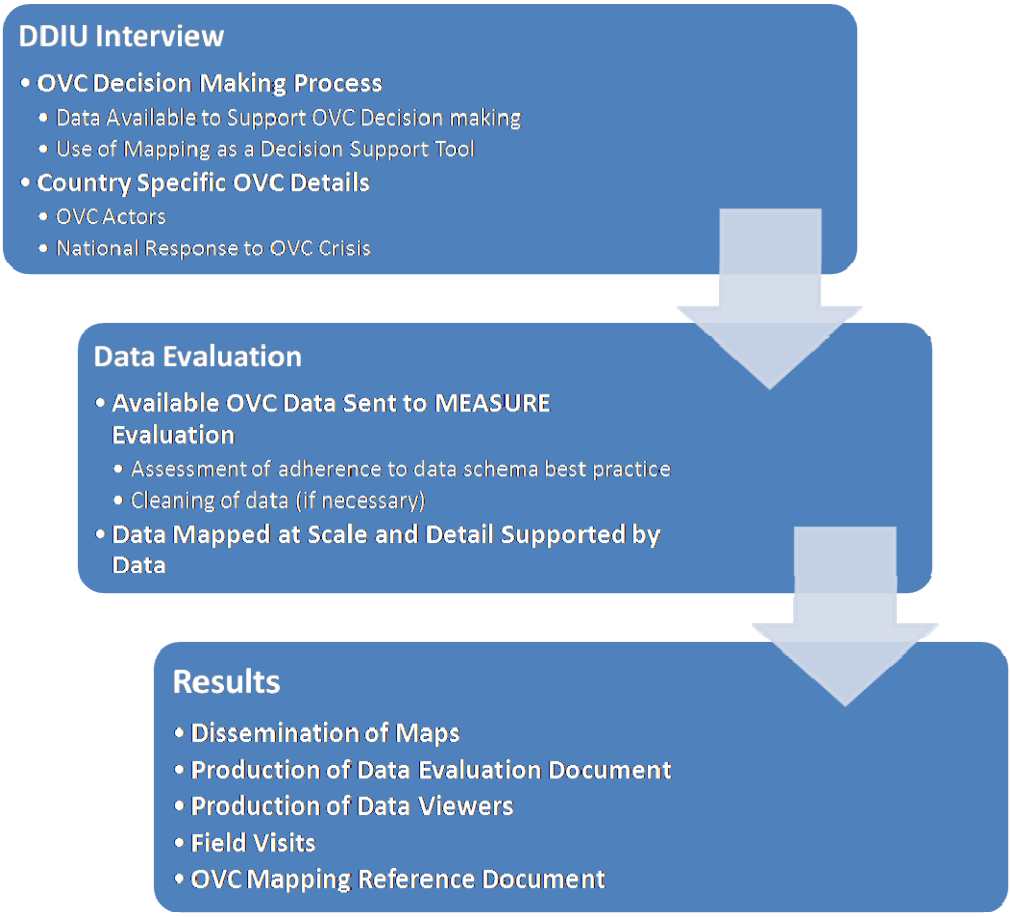


FIGURE 1 -- OVC MAPPING ACTIVITY FLOW CHART

DATA DEMAND AND INFORMATION USE (DDIU) INTERVIEW PHASE

The first step for the activity was to assess the data currently available to support OVC decisions and the decisions being made using the data. A DDIU interview was conducted with the USG OVC Focal Person, PEPFAR SI Liaison and USAID PEPFAR Lead, (as available) in each of the 12 countries. During the call, MEASURE Evaluation staff asked about the types of decisions being made, the types of data available to support the decisions, the gaps between the available data and the decisions, and how mapping may have been used in the past.

While specifics varied from country to country, there were some consistent themes presented in nearly all of the interviews.

DDIU Interview findings

- Desire of USG staff for more data to support OVC program decision making
- What data that do exist is fragmented and kept by different organizations with little data sharing.
- Acknowledged value in sharing data within USG and with other OVC program decision makers and actors

- Maps seen as a potentially valuable decision support tool

The desire for more data to support OVC decisions was frequently reported. Across all countries, interviewees noted that the data on OVC programs available to them was limited and often did not provide enough information to solidly support decisions that needed to be made.

Additionally, interviewees reported that the data that does exist is fragmented and available across different national government ministries, NGOs, and other key OVC program actors such as UNICEF, World Bank, etc. Some respondents expressed concern that PEPFAR may be duplicating efforts of other groups because USG teams had not always seen data on others key donors' OVC activities. Sharing data across OVC actors, national governments and PEPFAR would address this concern. Within the USG there was also a recognized need improve the sharing of data. For example, in one country, school locations had been collected by a branch of the USAID mission, yet the USG OVC team did not have these data.

Interviewees generally agreed that mapping OVC program data had potential to support program decision making. Using GIS as a decision support tool, however did raise concerns about the cost of mapping software and the time and costs necessary for training and capacity building.

In general the DDIU Interviewees reported that there was not enough available OVC program data to support OVC program decisions. In some countries this was due to a weak or inefficient M&E system for OVC programs. In other countries, useful data existed; however it was fragmented and spread across multiple organizations and institutions with little proactive data sharing. Data sharing was limited because of institutional barriers and the time required to overcome these barriers. Even when barriers were overcome, using the data could remain challenging because of data quality and standardization issues.

DATA COLLECTION AND MAPPING PHASE

In order to produce maps that could be useful for OVC program decision making, MEASURE Evaluation staff asked each country team to send its available OVC program data. The data was evaluated for its mapability, cleaned and organized when necessary, and then mapped. Well organized data for mapping can serve as a proxy for other decision support tools. Well structured data can be easily mapped, and also can be easily queried, analyzed and used to produce other decision support tools such as charts or tables. All of these decision support tools can facilitate and inform OVC program decision making.

The quality of the country data varied greatly, roughly a third of the countries provided data that conformed to standard data schema best practice[2] and was well suited for mapping. Roughly another third provided data that did not conform to standard data schema and required cleaning or changes to the data structure to make it mappable. The remaining third provided no data or data that was insufficiently detailed to support mapping.

Data Evaluation Findings

- Much of the data was not mappable without restructuring it to make it conform to standard data schemas
- Roughly a third of the countries provided data that could not be mapped because a geographic identifier was not included
- Roughly a third of the countries provided no data or data that could not be mapped.

In addition to the data provided by the countries, DHS data was also mapped, if available.

The activity sought to use what data was on hand or easily accessible to the USG team. Such data represents the data the team would use or have immediate access to for OVC program decisions. Since periods when USG teams must plan and develop OVC programs tend to be busy times there is not always a focus on data collection efforts or seeking data from various sources, and teams rely on data immediately available.

DATA VIEWER

The steep learning curve for GIS is one of the primary challenges for those wishing to map data. The learning curve means that it can be difficult for decision makers to use maps without investing time and effort in learning the software basics. A potential solution is a data viewer, an application that provides dynamic access to the maps without having a fully fledged GIS package on a user's computer. A GIS is still needed to produce the maps displayed in a data

[2] Data schema refers to the way data is structured in a data base

viewer, but the maps can be viewed by anyone with the data viewer software. Given the requirement of still needing a GIS program to create the maps, a data viewer is a partial solution to the problem of providing decision makers access to electronic, dynamic maps. The OVC Mapping Activity explored the utility of data viewers as a tool to support the OVC program decision making process.

There are two options for data viewers. The first, *ArcReader* is produced by ESRI, the company that produces the GIS program, ArcGIS. If maps are created in ArcGIS and saved in ArcReader format, the end user needs to install the free ArcReader software on their computer. Once the software is installed, the user can display the maps and turn on and off various data layers and print copies of the various maps. However, the user can not change data, add new data, or export the data to another software package such as Excel.

Another data viewer option is a .pdf file. This too requires someone to create the maps in a GIS program and save them, but since most users have a .pdf reader, such as Adobe Acrobat already installed, this option does not require the installation of additional, specialized software. With .pdf files, it is possible for the mapmaker to save the maps so that the layers are maintained in the .pdf file. This allows users who have the most recent .pdf viewer to turn layers off and on as needed. As with the ArcReader option, the user can not change or add data.

Not being able to change or add data means that a more sophisticated GIS program and the trained staff to use the software is still necessary. Additionally, the data viewer will only display the maps and data the GIS analyst has included in the viewer. This requires close communication between the GIS analyst and the users of the data viewer to make sure that the data displayed represent the needed data layers that will meet the end users'/decision makers' needs.

For the OVC Mapping Activity, an ArcReader based data viewer was created for each country that had viable data. The data viewer contained all of the maps produced for the activity, as well as Excel files containing the data.

DATA EVALUATION DOCUMENT

Each country that submitted data received a *Data Evaluation Document* that provided guidance on best practice for making sure data could be mapped. While the guidance was customized for each country, generic guidance on well formed data that follows data schema best practice was provided as well. This generic guidance is included in Annexes D & E.

LIMITATIONS OF THE ACTIVITY

There were some limitations to the approach used in the OVC Mapping Activity. Budget constraints did not allow for visits to each country for a detailed evaluation of all available OVC program and other relevant data. Data requests were made to USG teams in each country as well as in-country MEASURE resident advisors. MEASURE Evaluation resident advisors were not able to do any additional searches for OVC data in the country. Any data used was supplied by USG teams who took time out of their other work to participate in the interviews and to track down and send what data they had easy access to. Considering these realities, it is possible that countries have better data than what was provided for the OVC Mapping Activity. Despite these limitations, this approach served to illustrate what OVC program and other relevant data was readily available to USG in-country teams.

Resource constraints also limited the opportunity for more intensive work with each country team to review the findings and develop country specific plans for strengthening the data infrastructure, developing mapping capacity for improved evidence based decision making to support OVC program decisions.

SUMMARY

The OVC Mapping Activity was intended to be an assessment of the data that was available to USG teams making OVC program decisions and how that data was used to support OVC program decisions. USG OVC country teams were interviewed and asked about their decision making processes, available OVC data was requested, then evaluated by MEASURE Evaluation staff and mapped at a scope and level of detail supported by the data.

There were two related foci of the activity: evaluating the mapability of the data available for OVC program decisions in 12 PEPFAR countries and demonstrating how geographic data and mapping can help maximize the data infrastructure and strengthen OVC decision making. The activity focused on mapping for two reasons: mapping is a valuable decision support tool, and the mapability of the data can act as a proxy for the overall maturity of the data infrastructure and its integration into USG OVC program decision making processes. Data that can easily be mapped would indicate that the data was well-formed and followed data schema best practice and likely existed in either a spreadsheet or database program (or if not, could easily be placed in one). Additionally, when county teams were able to send data for mapping it indicated that the teams had data readily available. Such situations, easily available, well-formed data hint at a mature data infrastructure and a robust M&E system, both of which can lead to better OVC program decisions. Conversely if the data sent by each country team did not conform to data schema best practice or no data was available, it hints at a situation where decisions do not maximize opportunities for using all available evidence. Such a situation is more likely to

contribute to less effective programs, duplication of efforts, and missed opportunities to leverage programs.

SUMMARY OF FINDINGS

Developing a one-size-fits-all strategy for improving OVC programs is not possible, however there are generalizable findings from the OVC Mapping Activity, as well as experiences that every country interviewed seemed to share.

- Country teams wished for better data to support their decision making processes
- In many countries OVC data is fragmented across many organizations and institutions
- Data provided by country teams was often difficult to map because of data schema issues or lack of geographic identifiers.
- Data provided were often not at a scale or detail adequate to fully support decision making

DATA DEMAND AND INFORMATION USE STRATEGY FOR OVC PROGRAMMING DECISIONS

PEPFAR OVC Guidance Background

PEPFAR is mandated to "bring compassionate relief and support to countries, communities, families and children affected by the HIV/AIDS epidemic" (PEPFAR OVC Guidance, July 06). The complex nature of OVC programming means that program impact cuts across many aspects of society and therefore a multi-sectoral approach is required (PEPFAR OVC Guidance). Accordingly, PEPFAR has identified 4 goals for developing OVC programs:

1. Rapidly scale up compassionate care for OVC's
2. Build capacity for long term sustainability of care
3. Advance policy initiatives with direct outcomes that support care for OVC's
4. Collect strategic information to monitor and evaluate progress and ensure compliance with Emergency Plan policies and strategies

The OVC Mapping Activity focuses on the fourth goal and strengthening the ability to use data collected to support decision making and program planning.

OVC DATA

PEPFAR OVC reporting data is limited. The U.S. Congress mandated PEPFAR reporting at a national level for three indicators: total number of OVC served; caregivers trained and money spent. However, additional information is needed to monitor and evaluate in-country programs. The Office of the Global AIDS Coordinator (OGAC) encourages USG country teams to participate in and contribute to national reporting systems as well as work with partners to determine what supported programs may contribute to the national effort (United States Office of Global AIDS Coordinator, 2006).

In addition to PEPFAR activities, there are other OVC activities underway in a country which are part of its national OVC efforts (Programs supported by other funding sources GFATM, UNICEF,World Bank, other multi and bilaterals and foundations, as well as host country funded responses). Data associated with these activities can help complete the picture on a country's overall OVC activities and gaps in coverage when combined with PEPFAR and other national reporting data.

The issues around OVC programs are multi-faceted and complex, therefore a multi-faceted and purposeful approach to data collection, sharing and use is necessary.

DATA DEMAND AND INFORMATION USE

Evidence based program decisions are stronger than those decisions that are not evidence based. Making data available to decision makers can guide them towards better informed decisions. In the Monitoring and Evaluation (M&E) discipline, the concept of collecting and

using data to inform and support decision making is known as ***Data Demand and Information Use*** (DDIU) and it is crucial to effective M&E and evidence based decision making.

DDIU Principles

- Decisions that are informed by data and information can lead to better health outcomes.
- Collected data, when managed and reported properly, can paint a picture of reality.
- Data should be collected purposefully
- DDIU is a critical component of National M&E systems
- As data becomes a more important part of the decision making process, the demand for data grows

DDIU

"… without information, things are done arbitrarily and one becomes unsure of whether a policy or program will fail or succeed. If we allow our policies to be guided by empirical facts and data, there will be a noticeable change in the impact of what we do."

Director of Policy, National Action Committee on AIDS, Nigeria

DATA USE CYCLE

The collection and use of data follows an identified pattern. This pattern is known as the **Data Use Cycle**. According to this pattern, there is an initial demand for data. Data are then collected and made available to decision makers. Once the data is available, it will then used to inform decisions. As data is used for decisions, demand for more data will grow. Often this demand for new data will grow because the collected data helps identify gaps in knowledge that require collecting additional data as the situation changes over time. This data use cycle is not unique to OVC program data, but is present in all data collection efforts used to support monitoring and evaluation for programs. Figure 3 shows the data use cycle in the OVC program context.

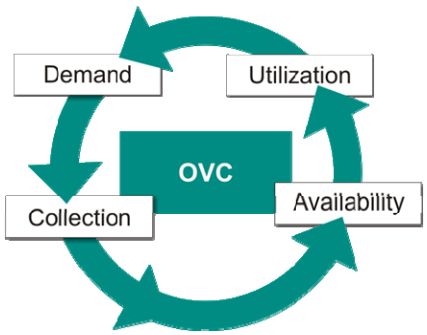


FIGURE 2 – DATA USE CYCLE

DDIU AND OVC PROGRAMS

In the context of OVC, DDIU is especially important. The PEPFAR OVC earmark means that money *must* be spent on OVC programs. This means program decisions will be made regardless of the data available to decision makers. However as stated previously, OVC will be better served and the outcomes will be better if the decisions are evidence based.

COMPLEXITY OF OVC ISSUE

The complexities of OVC programming mean that the DDIU strategy for OVC is also complex and multi-dimensional and decision makers should be open to data from sources beyond reported PEPFAR data and traditional OVC data sources. Data across many aspects of society can provide meaningful context for OVC program decision making. It is important that this data can be accessed and used to support decisions.

Putting it in the context of the data use cycle above, data is collected across many domains that influence a country's OVC situation, not just the OVC domain. Therefore according to DDIU principles, these data which are outside the OVC program domain should help inform OVC program decisions. It is important to look beyond OVC specific data to support OVC program decision making. There are multiple sectors that affect OVC programs that need to be considered when identifying or seeking data to support OVC program decision making.

DATA INFRASTRUCTURE

Data Infrastructure represents the foundation or inventory of accessed information for evidence based decision making. The term *data infrastructure* refers to all of the available data as well as the systems and processes in place to collect, update, maintain and disseminate data. The data infrastructure is dynamic, constantly changing and grows stronger as more data becomes part of it. The data infrastructure can be organized into domains which are groupings of data that are cohesive and thematically consistent. Keying data to geographic areas also helps to strengthen the usefulness of the data.

DDIU AND THE DATA INFRASTRUCTURE

Decisions informed by data can lead to better program outcomes. Too often, however, data users limit their selection of data to the domain in which they are working. For instance, OVC teams restrict themselves to just OVC data or ART teams limit themselves to ART data. This can happen for many reasons, such as a lack of familiarity with other datasets, difficulty in obtaining data, or the challenges that exist when combining datasets. In many cases using the broader data infrastructure can help with synergies across OVC and other key PEPFAR and HIV response actors, especially when programs operate in same geographic spaces and serve the same populations.

All M&E data go through the same cycle as shown in Figure 3 (demand, collection, availability, and utilization) regardless of the topic. The result is a collection of data for each domain. The PEPFAR suite of services are often interlinked and activities in one domain (e.g. ART) might have implications in another (e.g. OVC). Therefore it's important to consider all of the data as being part of the same data infrastructure and not separated by domain. This can help to foster increased synergies or 'wrap-around', leveraging one component with another. In other words the data infrastructure refers to data on OVC, PMTCT, ART, etc. In fact, relevant data likely exists in domains outside the realm of PEPFAR activities, such as national public health data, national economic data (from other donors funded programs such as GFATM UNICEF or World Bank and other data sets).

In short, the PEPFAR data infrastructure is the entire national infrastructure. As Illustrated in Figure 4, the various domains can be thought of as cells in the data infrastructure.

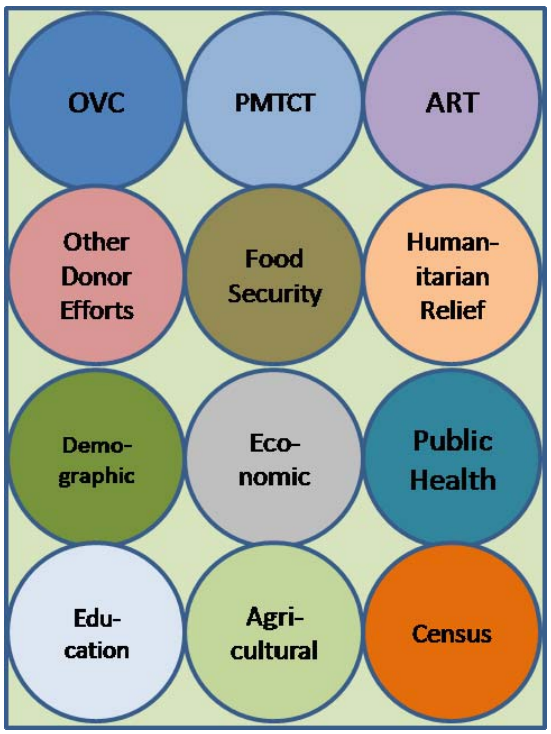


FIGURE 3 – SOME OF THE DOMAINS IN DATA INFRASTRUCTURE

IMPLICATIONS FOR OVC PROGRAMMING

The importance of a cross cutting, integrated approach in addressing the OVC issue is recognized (UNAIDS, 2004 [A]) (UNAIDS, 2004 [B]) (United States Office of Global AIDS Coordinator, 2006). Additionally, the importance of a strong, robust OVC programs M&E component is also acknowledged. (UNAIDS, 2004 [B]) (UNAIDS, 2004 [A]). Accordingly, the M&E strategy for OVC strategic program decisions should be as robust as possible and incorporate data that is cross cutting and reflects not only societal issues that may be important for OVC programs but also integrate OVC activities across sectors and various funding sources.

The development of indicators for OVC M&E that reflect this integrated, cross cutting approach is beyond the scope of this paper, however in general the following domains can inform program decisions:

- National Government activities not covered under "donor activities" including national M&E system indicators, plans of actions, prioritization, etc.
- Multi and bi-lateral donor activities (such as PEPFAR, UNICEF, World Bank, etc.)
- Relevant Socio-Economic Data such as:
    - Census data or other demographic data
    - Food Security (e.g. FEWS)
    - Humanitarian Response Data

    - Education Data
    - Poverty Data
- Relevant Public Health Data such as:
    - DHS Data
    - HIV/AIDS specific Data
    - Health Facility Data

Many different dimensions of society affect the OVC situation in a country. The demographic characteristics, national economic conditions, the public health system, educational institutions, and many other dimensions can have a substantial impact on the OVC situation in a country. Decision and policy makers who plan and program OVC services should, at the very least, have the option to include the relevant non-OVC data into their decision making processes. These external domains may not be appropriate for every aspect of OVC program planning, but they should be available to the cases where appropriate.

Integrating The Data

The domains that influence the OVC situation follow the same cycle of *demand*, *collection*, *availability*, and *utilization* described above in Figure 3. As the data is collected for each domain, the data exist somewhere and can be accessed and be made available for use to inform OVC program decisions. In other words, each domain is contributing to the potential data infrastructure to support OVC programming decisions. As the data infrastructure matures, a richer picture of the situation in each domain develops and this allows for increased access or complement for other domains. When data from multiple domains are combined together, it provides a richer picture of the situation and the relationship between the domains.

If some of the domains from Figure 4 are added to the data use cycle presented in Figure 3 above, a maturing data infrastructure can be represented this way:

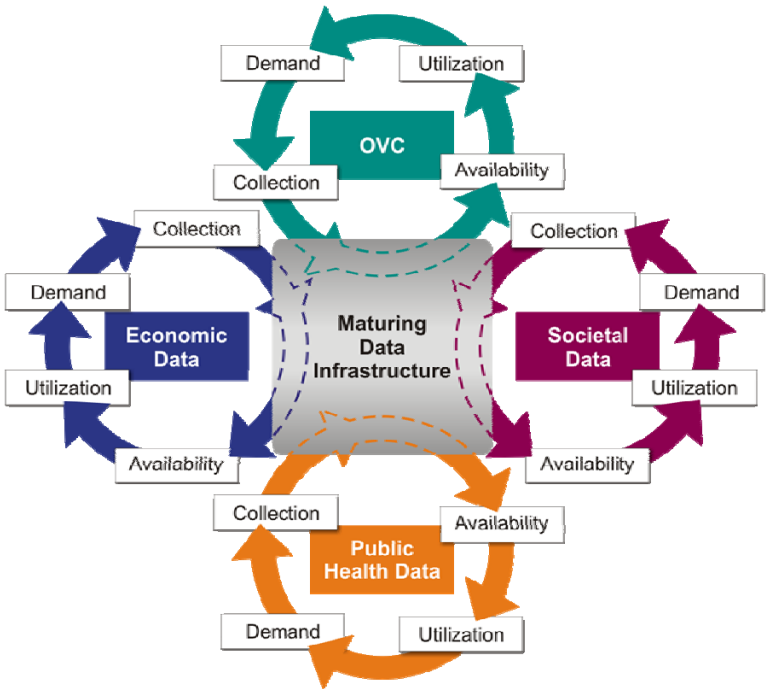


FIGURE 4 -- DOMAINS THAT SUPPORT OVC PROGRAM DECISION MAKING AND THEIR CONTRIBUTION TO THE DATA INFRASTRUCTURE

As each domain goes through its data cycle, the data infrastructure matures and the potential data available to support an integrated OVC decision making process increases.

The relationship works in the other direction as well. OVC data can assist program planners in other, non-OVC based areas. For instance OVC and HIV/AIDS program data has been identified as a valuable component of Food Security based efforts (United Nations World Food Programme, 2008).

OTHER OVC ACTORS

PEPFAR is not the only OVC actor in a country. National governments, NGO's, and other donors have their own OVC programs with activities. In most cases there are M&E systems in place for these activities. Some of these systems may be linked with PEPFAR M&E systems, some of which may not be. The data from these M&E systems are also part of the data infrastructure. It is important to the extent possible, that data from these other OVC programs is included in the decision making process for PEPFAR activities; to avoid duplication of effort, identify areas of complement and ensure efficient use of resources.

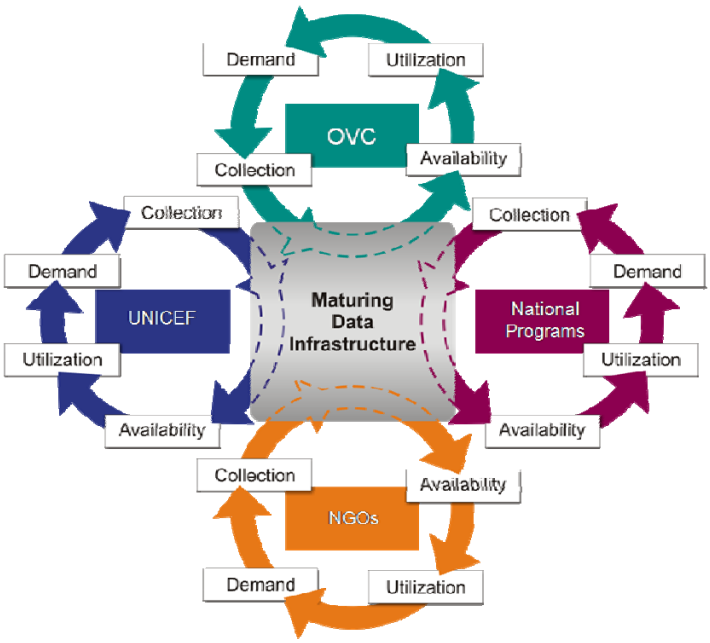


FIGURE 5 -- OTHER OVC ACTORS CONTRIBUTE DATA TO THE DATA INFRASTRUCTURE

One of the guiding principles of PEPFAR's OVC programs is to "Strengthen networks and systems and leverage wrap–around programs" and to "Link HIV/AIDS Prevention, Treatment and Care Programs" (United States Office of Global AIDS Coordinator, 2006). This commitment to a strong, integrated OVC support system can be realized by integrating relevant data from other OVC actors with the available data infrastructure and then include it in the OVC decision making processes.

Challenges to Integrating Data

There are several challenges when trying to integrate data from the various domains. Despite these challenges, it is important to integrate data from the relevant and accessible data infrastructure domains whenever possible.

Familiarity with other data sets

Data sets relevant to OVC program decisions that exist in a country are often collected by many different institutions and organizations. Awareness of existing data depends on inter-personal and inter-organizational communication. Often the knowledge of other data sets relies on a potentially haphazard network of internal publications, word of mouth and happenstance.

Data Sharing Among OVC Actors

Sharing data between OVC actors can be challenging. Issues of data ownership and the willingness and ability of different organizations to share their data may complicate an

integrated approach. However, knowing what other OVC actors are doing can avoid duplication of efforts and improve OVC program outcomes. Additionally, other OVC actors may have data on OVC populations that will help USG OVC program planners better understand the OVC situation in a given country. Ideally, the national program authority charged with OVC response will help lead the effort to bring the various data sources together to help make information more widely available.

Data Comparability Issues

One issue that should be considered when using data from different sources is the compatibility of the data sets. Data from different sources across different domains may represent different time frames, or have been collected at different scales. These challenges can limit the comparability of data sets or require data cleaning or restructuring in order to make the data usable. It is also important to recognize and accommodate these and other limitations of the data.

Overcoming data integration challenges

Making data widely Available

Since lack of familiarity with available data can limit the ability of decision makers to use the full data infrastructure to support OVC program decisions, it is important to make sure there is a robust data dissemination strategy. Disseminating collected data as widely as possible ensures that it is part of the available data infrastructure. Additionally, sharing data can open channels of communications with other OVC actors and other contributors to the data infrastructure. Making data widely available can make others aware of collected and available data and can address the lack of familiarity with other data sets that may exist.

Communication and Data Sharing within USG

USG efforts in a country often cut across many aspects of society, education, humanitarian relief, etc. As a result of these activities, USG collected data may already exist. Improving communication within USG can make sure that this collected data is available to support other USG activities.

Communication and data sharing between OVC Actors

Communication between OVC actors is important not only to facilitate data sharing, but to ensure there is a coordinated, strategic effort to address OVC programming. National OVC programs, bi-lateral and multi-lateral organizations, NGO's, and USG teams are all invested in improving OVC program outcomes and should all be aware of each others' activities. Sharing of data between OVC actors to the extent possible helps to minimize duplication of effort and prevent resources from being used inefficiently for all OVC actors.

Taking advantage of data integration tools

Geographic Information Systems (GIS) can be a valuable tool to address issues such as variations in scale and time frame, as well as data comparability. As described in the following section, geography can be the key that facilitates linkage of data sets.

Plan for Integration

One of the most important ways to overcome data integration challenges is to plan for linking data to other sources and planning for its dissemination to key stakeholders. Linking newly collected data with previous data is much easier if there is a strategy in place to do so.

Summary

The complexities of OVC programs require use of data from different sources and domains. OVC programming decisions can benefit from a robust M&E system that provides enough data to support OVC program decisions. A robust system is not limited to only OVC related data, but data from domains other than OVC programs, such as economic, public health, social and demographic data. Decision makers should use the full data infrastructure to support their programming decisions. Using the full data infrastructure means being aware of the limitations of the data and making sure the data is used wisely. Making use of the full data infrastructure also requires integrating different data sets so that they can be synthesized and used to support OVC programming decisions. When a geographic identifier is included, GIS can provide the mechanism to manage and integrate the data in the data infrastructure.

Applying DDIU principles to OVC program decisions can help ensure that decisions are increasingly based upon evidence. Incorporating as much of the data infrastructure as possible will also strengthen OVC program decisions, since many different aspects of society affect the OVC situation in a country. There are challenges to implementing a DDIU approach to OVC program decisions and thoughtful planning is required for locating and accessing other relevant data.

USING GEOGRAPHY AND SPATIAL TOOLS TO INTEGRATE OVC DATA

USING GEOGRAPHY TO INTEGRATE DATA

The data infrastructure that results from M&E data collection will likely be made up of many different data sets from various M&E activities. For instance, data from surveillance systems, routine health data, and survey data are examples of data that might be available from M&E activities. For the reasons described in previous sections, it can be difficult to synthesize all of this data into one picture of reality that can be used for decision making. It can be difficult to find the common thread across multiple data sets. Geography is useful to overcome some of the challenges of linking and integrating data.

All human activity takes place somewhere on earth. Therefore it is possible to link ***what*** is happening with ***where*** it is happening. A geographic link can provide the common thread to stitch the data together. When the location of an activity or phenomenon is known, it is possible to look at the activities' relationship to other things happening in or near that location. A Geographic Information System (GIS) is the tool that can make this easier.

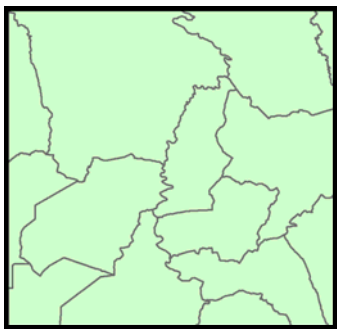


Figure 7.1: District Boundaries

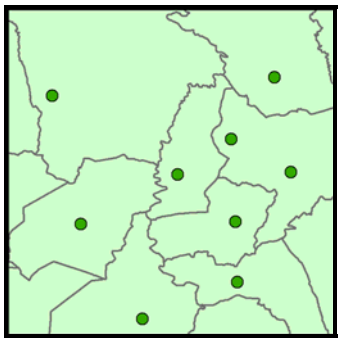


Figure 7.2: District boundaries and village locations

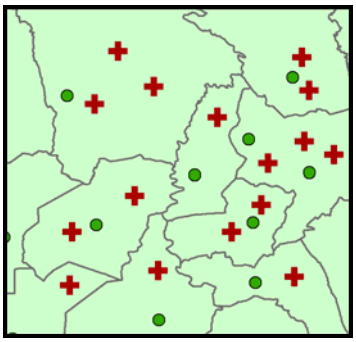


Figure 7.3: District boundaries, village locations and facility locations

FIGURE 6 -- LAYERS IN A GIS

LAYERS IN A GIS

GIS manages data as layers on a map. Within a GIS you can have data from one file in one layer, and data from other files as other layers. For instance it would be possible to use a data file for

districts in a country (Figure 7.1) then read in data from a completely different file, say village locations and make it a layer on top of the first data set (Figure 7.2). Lastly, data from a facility survey could be added as a layer and show locations of health facilities (Figure 7.3). So in the end, the result is a map that brings together data from three separate data sets, displayed on top of each other in a way that highlights the relationships between the data.

It is possible to include any dataset that has a geographic identifier in a GIS. If the data in the data infrastructure contains geographic identifiers, a GIS can display and link them.

Geographic Identifier

In order to put data into a GIS, it is necessary that the data include a geographic identifier. A geographic identifier is any data element that indicates where the data refers to. Since all human activity takes place somewhere on Earth, it is possible to assign a location to virtually anything.

Common Geographic Identifiers

- Region
- City
- Address
- District
- Village
- GPS Coordinates (Latitude/Longitude)

Using GIS to Produce Decision Support Tools

GIS and other mapping applications can perform a second important function; they can produce maps which can serve as decision support tools. This dual functionality make GIS an important tool to support OVC program decisions.

Summary

Virtually all human activity happens somewhere on earth. Ensuring that data collected includes geographic identifiers, or adding a geographic identifier to data that does not have identifiers provides a geographic context. This geographic context can not only help provide additional insight about OVC issues, it can also act as the link between different datasets that might not be linkable without a geographic identifier.

This dual purpose, providing geographic context to support understanding of data, as well as facilitating linking of data illustrate how important it is to add geography to data.

OVC MAPPING ACTIVITY RECOMMENDATIONS

RECOMMENDATIONS FROM OVC MAPPING ACTIVITY

The findings from the OVC Mapping Activity show the importance of having a DDIU strategy for OVC decision making. The activity also demonstrated how mapping can accomplish two important goals. First, mapping provides a valuable decision support tool that can assist OVC program decision makers and program implementers; and, secondly, serving as the mechanism that permits the linking of different elements of the data infrastructure. Using as much of the data infrastructure as is practical will provide more potential for evidence based decision making.

During the DDIU interviews, there were three principle findings:

DDIU Interview findings

- Desire of USG staff for more data to support OVC program decision making
- What data that do exist is fragmented and kept by different organizations with little data sharing.
- Acknowledged value in sharing data within USG and with other OVC program decision makers and actors
- Maps seen as a potentially valuable decision support tool

The first two findings indicate a perception that USG teams do not have access to the data they need, either because the data does not exist, or if it does exist it can be difficult to obtain and use.

To overcome access issues, it is important to identify what data does exist and who maintains it. This requires a focus on the data infrastructure and understanding what data is in the data infrastructure. The next step is to improve communication and data sharing with other OVC actors. This can lead to additional data that can be used to support OVC program decision making, and also reduce the risk of duplication of effort across programs.

Improving communication and data sharing within USG is also important. USG efforts often contribute to multiple sectors of a country. Data collected as part of these efforts can inform OVC program decision making and vice versa.

Once additional data from the data infrastructure has been developed, it can be a challenge to integrate with existing OVC data. A GIS can assist with this by using geography to provide the link between data sets.

RECOMMENDATIONS

TO ADDRESS THE PROBLEM OF LINKING DATA SETS AND DATA SHARING:

Include a geographic identifier in OVC data

As stated previously, geographic identifiers are important not only because they are the key to being able to map data, their inclusion in collected or reported data is important because it is allows decision makers to know *where* things are happening. Absent any knowledge of where programs occur or where populations in need may be found, it is impossible to know whether services are reaching the people they need to reach. If geographic identifiers are not included in PEPFAR data, PEPFAR team members have a large and critical blindspot which could limit the effectiveness of PEPFAR program planning and the decision making processes.

Follow data schema best practice

It is also important that the data that is collected be stored in such a manner that it is easy to go back and recreate previously generated numbers or calculate new numbers such as trends across multiple reporting periods, etc. The best way to accomplish this is by making sure the data is stored in electronic files that follow data schema best practice. As discussed in Annexes D and E, best practice dictates that data across multiple reporting periods is stored in identical (or compatible) formats and schemas. Additionally, the data should be structured one record per geographic unit, with variables in columns. Finally, data should be stored to facilitate analysis and not just to support production of publications. This means a spreadsheet program (e.g. Excel) or database program (e.g. Access) be used to store, maintain and update the data. Word processors such as Word should *never* be used to store data.

Use as much of the data infrastructure as possible

Evidenced based decision making needs data to be effective. The more data that can be used in support of decision making, the better the understanding of the issue can be. Decisions makers should use as much of the data infrastructure as possible in the decision making process. This means looking beyond just OVC data and exploring other data that might be available.

Share data

Using the full data infrastructure for decision making means that there should be data sharing across organizations involved in OVC programs. Often there can be barriers that prevent or limit the sharing of data. While there are legitimate reasons to limit sharing of data such as

confidentiality concerns, wherever practical, data collected should be as widely available as practical.

Plan for integration of data during data collection

Data collection efforts should recognize the value of linking the data with other data sets that may exist. By including a geographic identifier and using standard codes that may exist (such as for health facilities) it can be much easier to integrate the data with the rest of the data infrastructure.

TO ADDRESS ISSUE OF DATA FRAGMENTATION:

Make sure there is a clear data flow from implementers to decision makers and vice versa

M&E systems can generate a considerable amount of data. For maximum efficiency it is important that this data be able to be processed and analyzed in order to support decision making. This means that there should be a clear plan for how data flows through the system. It is extremely important that reporting data can move from the implementers in the field to the decision maker's desk as well as from the decision maker to the implementers. To ensue data sharing and use, there should be a clearly defined data flow that stipulates who is responsible for collecting the data from the implementers, who is responsible for data cleaning and entry, who is responsible for any aggregation or calculations that are necessary, and providing decision makers with relevant data summaries, as well as who is responsible for ensuring compliance with any PEPFAR or national government reporting requirements. In addition to having a clearly defined data stream, there should be clearly defined definition of indicators and description or terms included in the M&E reporting system.

Communication between OVC and USG SI Teams

USG efforts in support of the full range of PEPFAR services can be complex and involve many different national agencies, implementing partners, local and international NGOs and other donors. It can be difficult for OVC teams to have knowledge about all aspects of USG activities. The PEPFAR SI teams however can serve a valuable role coordinating opportunities for data sharing and transfer across USG activities. The SI teams are in a unique position to maximize the synergies that might be possible by linking USG activities.

CONCLUSION

Initially the OVC Mapping Activity was focused on the use of geographic mapping to support USG OVC program decisions, however after interviewing USG teams about the decision making

process and the available data, it became clear significant issues existed regarding the data infrastructure. These issues were impacting the decision making process and addressing these issues was necessary before a mapping capacity could be addressed in many countries.

Taking full advantage of the data available in the data infrastructure, sharing data with other OVC actors and improving communication and data sharing within the USG team will lead to improved OVC program decisions. These steps will also facilitate an environment that can lead to the creation of effective decision support tools such as maps which will in turn also lead to improved OVC program decisions. Using GIS and general best practices on data collection and storage will help to increase evidenced based decision making.

ANNEX A: OVC DATA FLOW

OVC DATA FOR DECISION SUPPORT

As the broader data infrastructure is used to support OVC decision making, the data demand and information use (DDIU) principles mentioned previously provide valuable guidance for OVC data collection and use.

DDIU Principles

- Decisions that are informed by data and information can lead to better health outcomes.
- Collected data, when managed and reported properly, can paint a picture of reality.
- Data should be collected purposefully
- DDIU is a critical component of National M&E systems
- As data becomes a more important part of the decision making process, the demand for data grows

These principles illustrate the strong link between data and decision making and how not only should data be used to support decision making, decision making needs can help support data collection.

DATA SUPPORTING DECISIONS AND DECISIONS INFORMING DATA COLLECTION

The data use cycle in Figure 3 illustrates this relationship. As data is collected and made available and used, there is a demand for more data. The data collected is informed by this new demand for data and can address any gaps in knowledge that existed with the previous data or focus on new developments that decision makers should be aware of.

While Figure 3 shows this as a circle, such data flows are sometimes seen as bottom up, with reporting data flowing from activities within the country up to a central authority. Figure 8 is a representation of the data flow for an actual country which has been simplified for display purposes. It represents a typical bottom up data flow. Data flows from the bottom (Community) up to the top (National or Ministry).

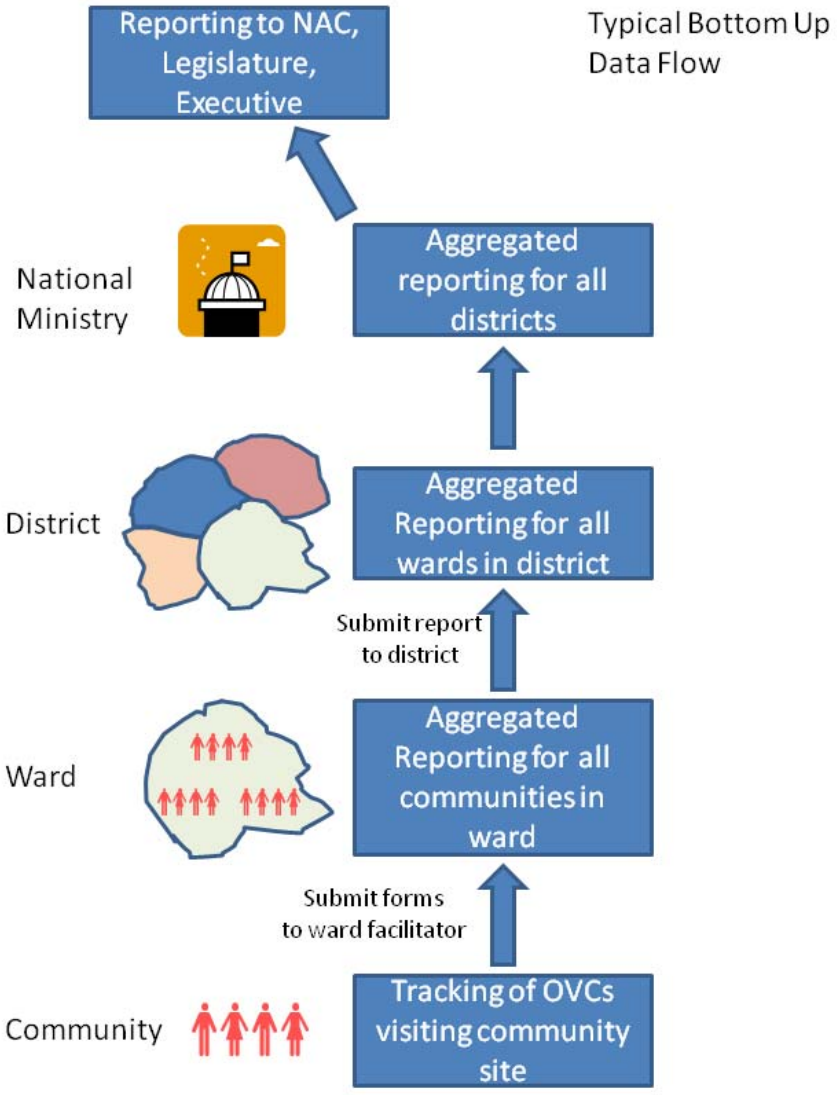


FIGURE 7 -- TYPICAL DATA FLOW

DDIU principles would encourage data to not only flow from bottom up but from the top down. This would allow the data to inform decision making at all levels. As illustrated in Figure 9, data flows not only from bottom to top, but flows back through the system to the community, ward and district level. This multi-directional data flow is beneficial for several reasons. First, it ensures buy-in for the M&E system since it gives actors at each level the chance to see summary information about themselves and others. Another reason that it can be valuable is

NGO's who are providing services can use the reports to gain additional funding, since NGO's will be able to demonstrate to funders past performance as well as demonstrate the ability to perform M&E on their activity.

DATA FLOW

In order for data to effectively flow through the system, there should be a clearly understood process that describes the way data flows as well as who has responsibility for moving the data through the system.

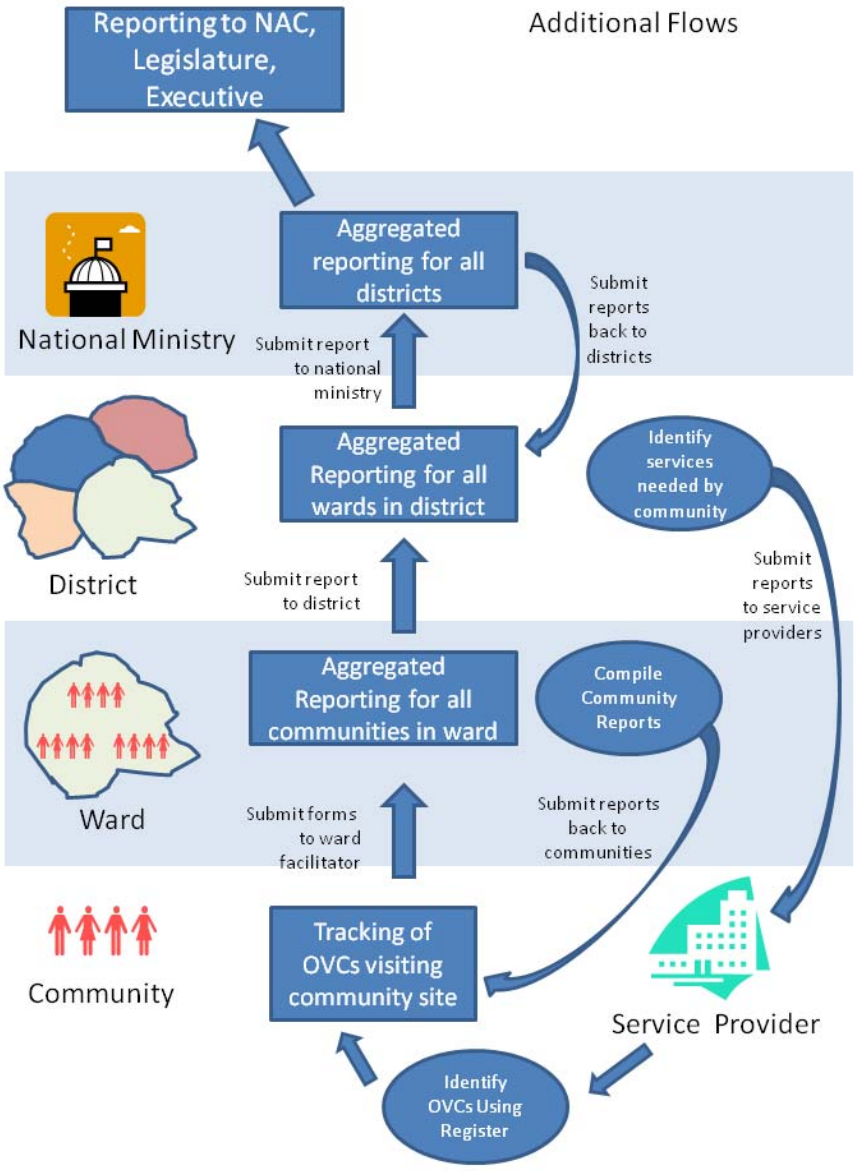


FIGURE 8 -- DATA FLOW THAT INCLUDES DATA SHARING

SUMMARY

Data flow is an important but often overlooked aspect of M&E. Without an effective plan for how data flows through the system and who has responsibility at each stage for data quality checking, aggregation and dissemination, data can stagnate in the system or move inefficiently. Such inefficiencies can undermine M&E efforts and can limit decision makers' abilities to make effective, evidence based decisions.

ANNEX B:
CASE STUDY:USING GIS TO INTEGRATE DATA FROM MULTIPLE SOURCES TO SUPPORT OVC DECISION MAKING

USING GIS TO INTEGRATE DATA FROM MULTIPLE SOURCES TO SUPPORT OVC DECISION MAKING IN NIGERIA

BACKGROUND

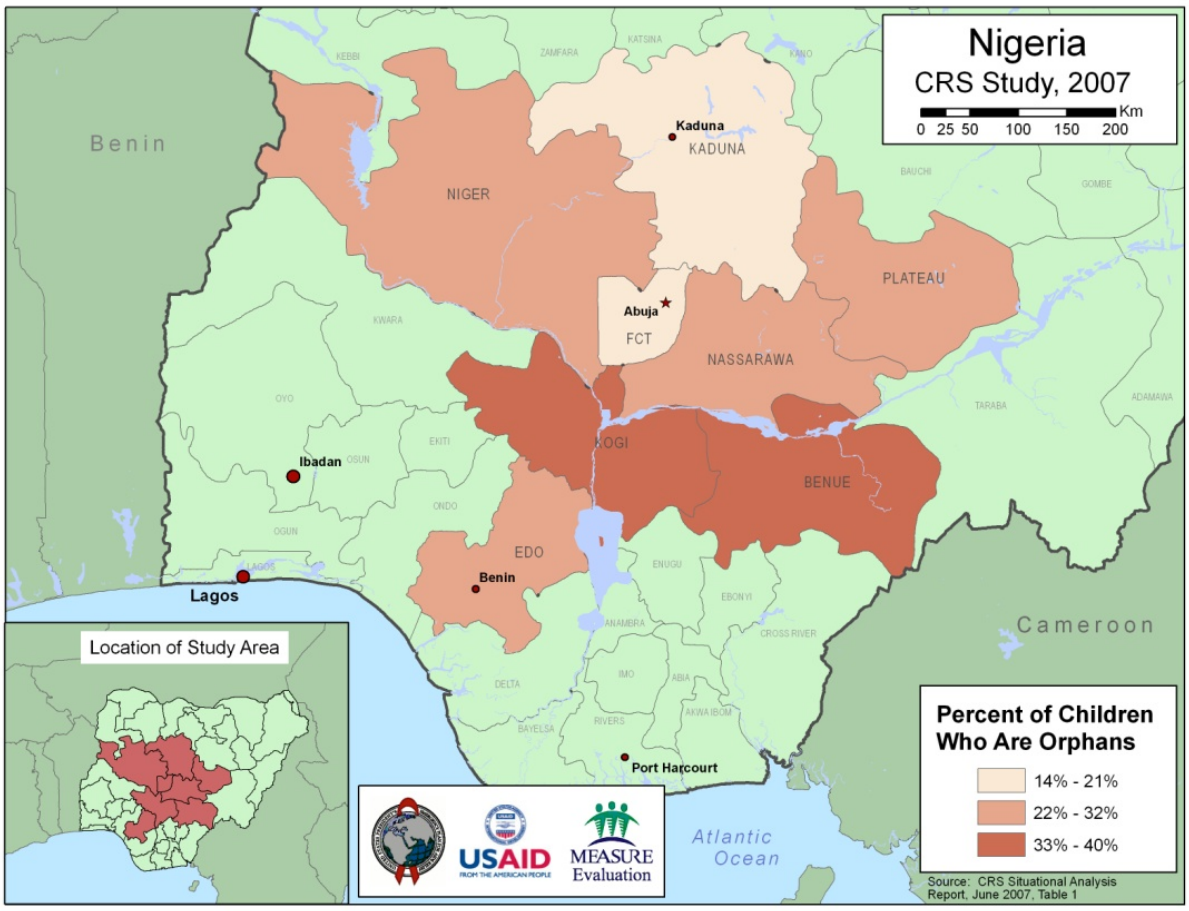
In 2007, an OVC situational analysis was conducted in eight states in Nigeria by Catholic Relief Services (CRS). The data collected from this situational analysis can help planners understand the OVC situation in these eight states; however the data collected from the situational analysis can be strengthened by including data elements from the broader data infrastructure.

The maps below show how data elements from the CRS situational analysis can be useful decision support tools by mapping the data and combining it with other data sets as well as how adding data from the broader data infrastructure can bring a new perspective to the data. In addition to geographically illustrating patterns in the data, the maps can also prompt questions that can require further investigation. As useful as maps may be, it is important to stress that maps should be just one decision support tool program planners use.

The examples below are intended to illustrate a process where data from the situational analysis can be combined with additional data from the data infrastructure and used to develop materials to support OVC program decision making. The maps can be integrated with other decision support tools to provide additional information to support evidence based decision making.

WHERE ARE OVC?

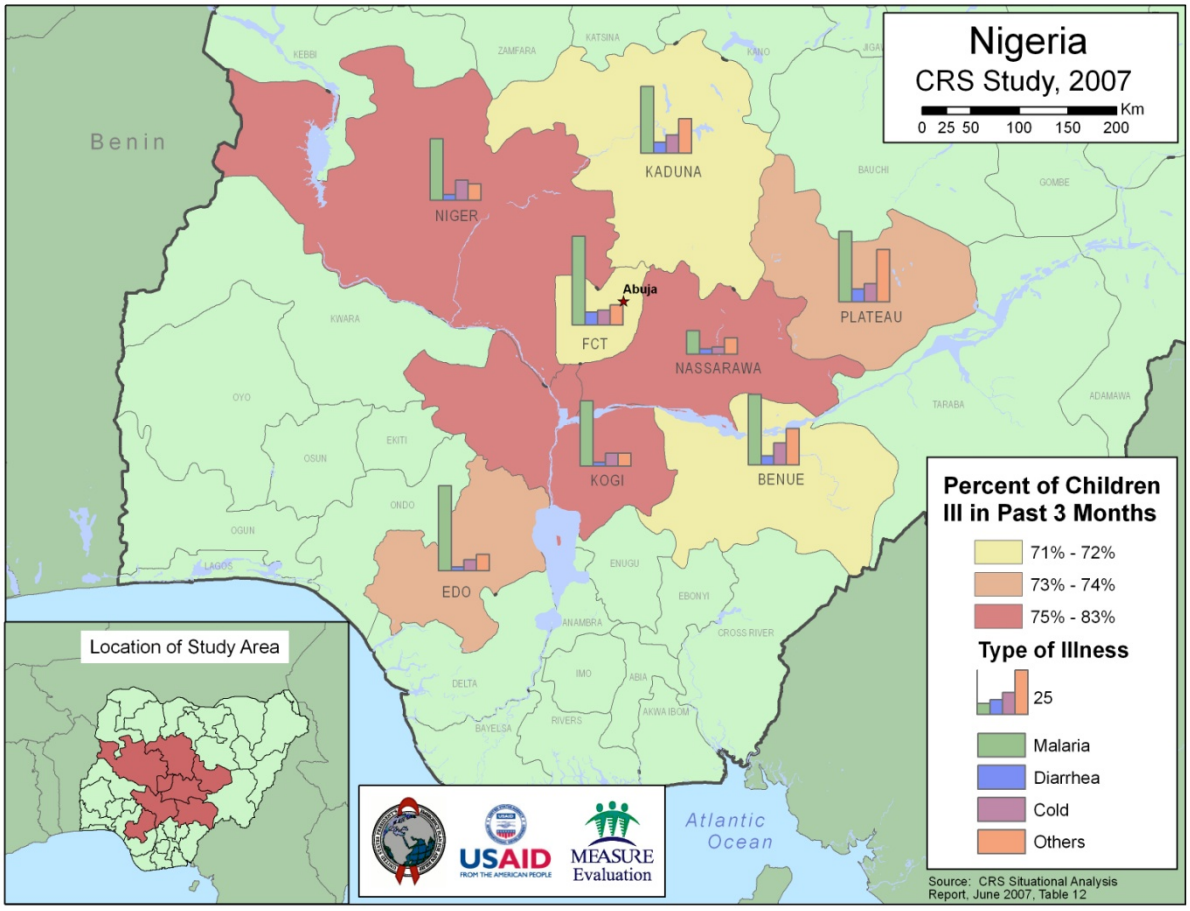
A good place to start is to develop an understanding of the location of orphans in the country. Map 1 (below) shows the percentage of children who are orphans in the eight states where the situational analysis was conducted. The states of Benue and Kogi have the highest percentage of children who are orphans. This map, along with other decision support tools can help program planners assess the relative demand for OVC services.



MAP 1 BASIC MAP DISPLAYING ONE VARIABLE

ADDING TO THE KNOWLEDGE OF THE OVC SITUATION

Next it can be valuable to look at the relationship between OVC location and other data. Maps can be used to display one variable, as illustrated in Map 1. Sometimes it is useful to see multiple variables on a map, especially if the two variables have an important relationship to one another. Map 2 shows the percentage of children ill over a three month period and the type of illness the children experienced.



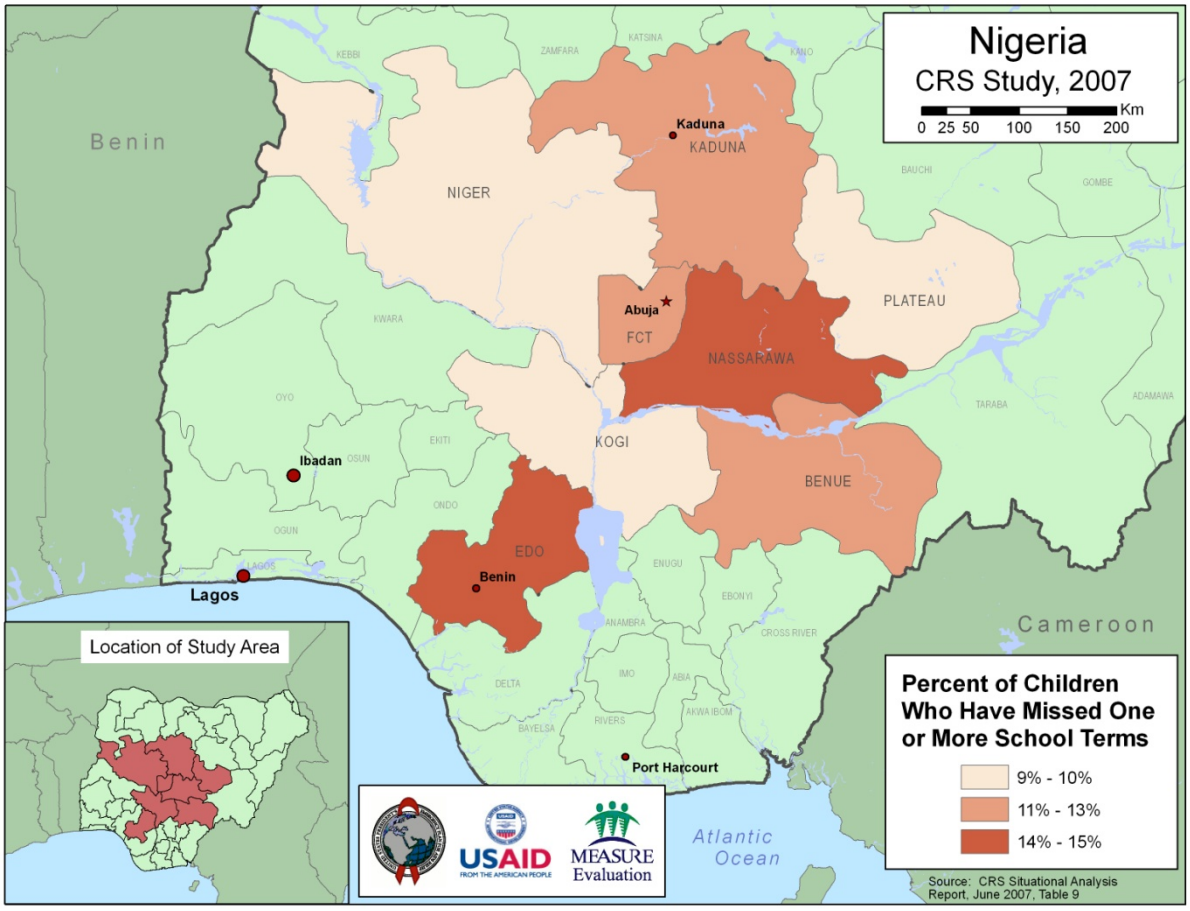
MAP 2 CHILDREN WHO HAVE BEEN ILL AND THEIR ILLNESS

The map shows that the majority of children in the eight states were ill over the three month period prior to data collection and that in all states malaria was the predominant illness. This type of information might support a malaria specific intervention across the eight states.

USING MULTIPLE MAPS TO TELL A STORY

Multiple variables from the CRS Situational Analysis can help tell a story about key aspects of the OVC condition.

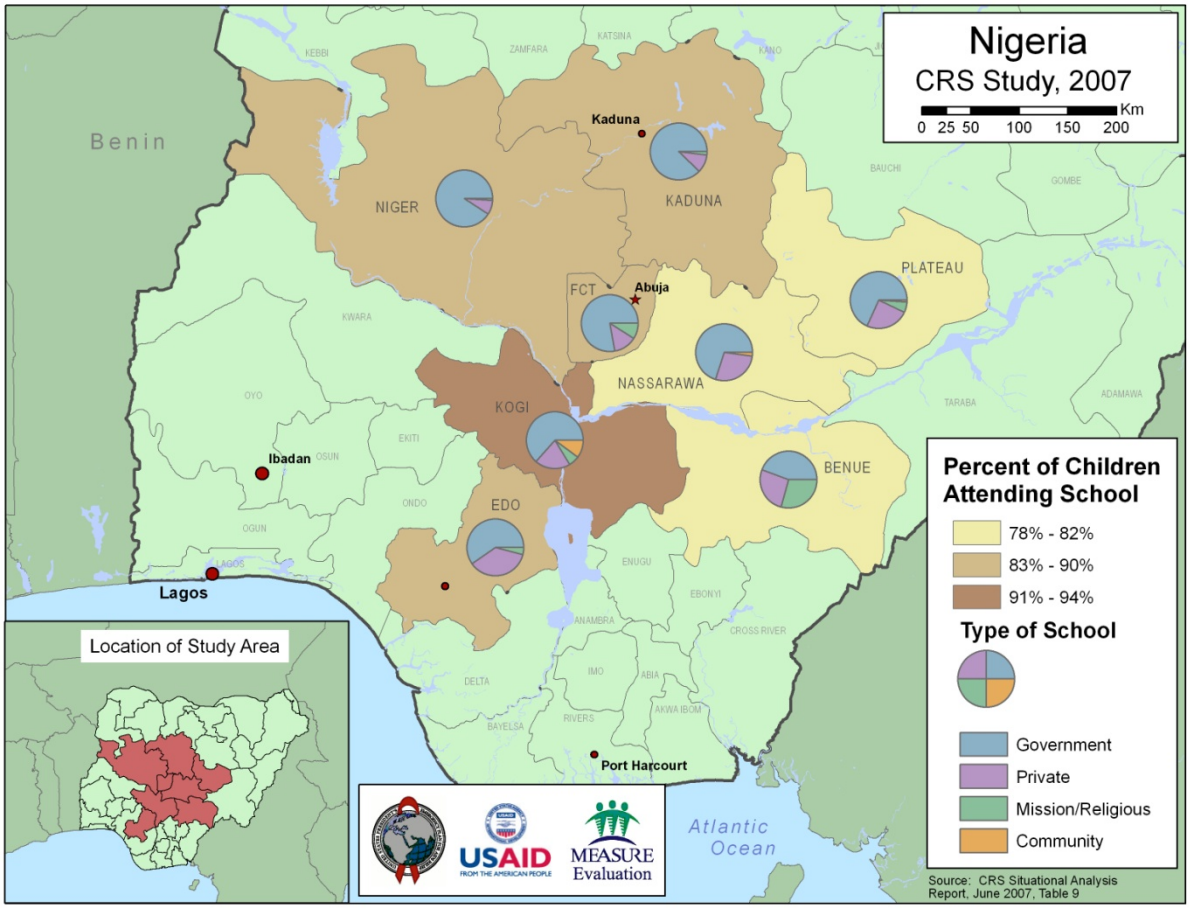
Missing school can make children more vulnerable, Map 3 shows the percentage of children who have missed one or more school terms.



MAP 3 CHILDREN WHO HAVE MISSED ONE OR MORE TERMS

The map above shows that two states, Nassarawa and Edo have the highest percentage of children who have missed school terms, though all states have similar numbers. This map, while somewhat helpful, really only presents a part of the puzzle.

Knowing something about school attendance and type of school can fill in more gaps about the school situation. Map 4 shows two variables: the shading for the states shows the percentage of children attending school, while the pie charts in the states show a breakdown by type of the schools in the state. The three eastern states, Plateau, Nassarawa, and Benue have the lowest percentage of children attending school. Most of the schools in these three states are government schools, with Benue having a nearly equal number of mission/religious schools as private schools.



MAP 4 SCHOOL ATTENDANCE AND TYPE OF SCHOOL

These maps can help planners and decision makers determine if school interventions can reach OVCs and help determine the types of schools that should be part of an intervention program.

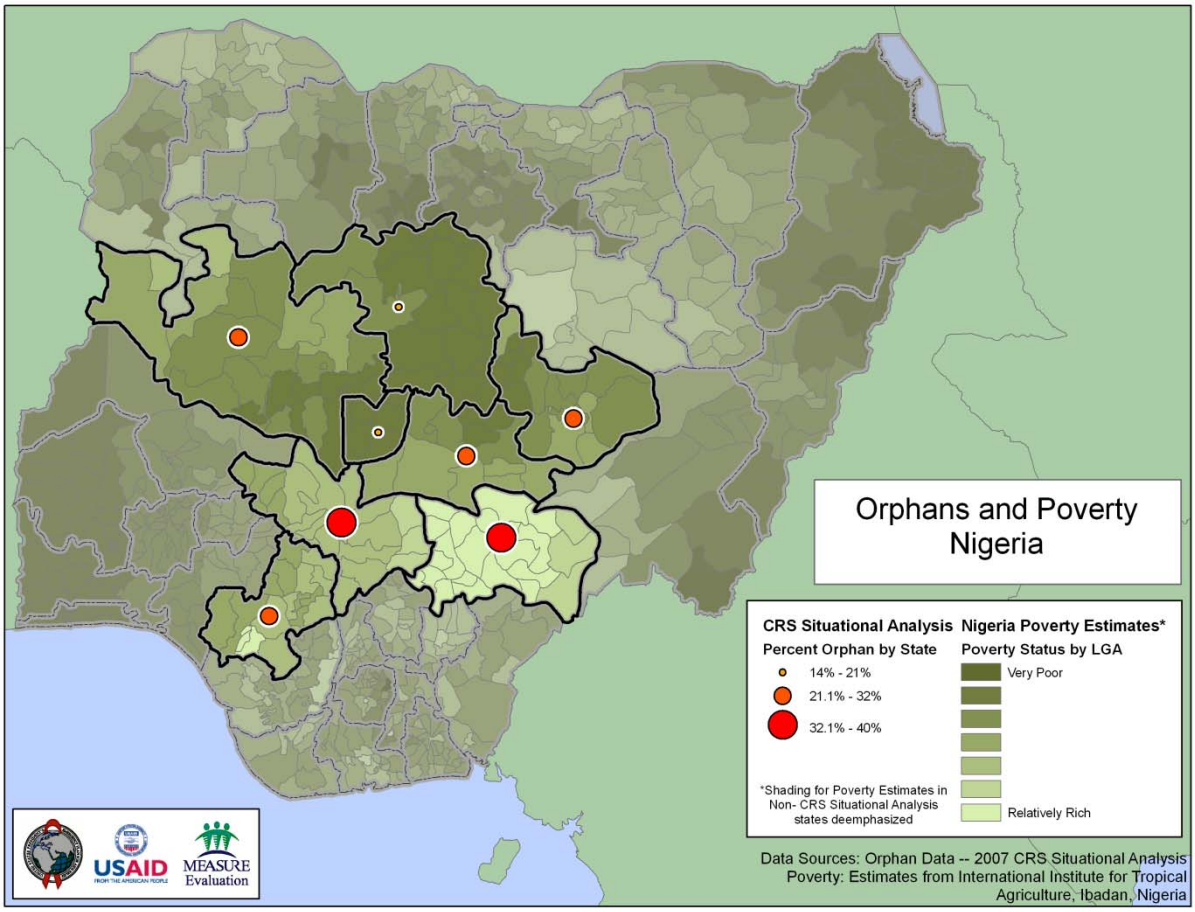
MINING THE DATA INFRASTRUCTURE

Program planners should not limit themselves to this one situational analysis when making decisions. All of the elements of the data infrastructure should be utilized to arrive at the most complete picture possible.

One element that is important to OVC is poverty. According to the CRS Situational Analysis, issues of poverty in the eight states can not only make children at risk for illness, mal-nutrition and other undesirable conditions, poverty can contribute to guardians inability to care for new OVCs. Since the CRS Situational Analysis report did not report findings specific to poverty, it is necessary to obtain that information elsewhere.

The International Institute for Tropical Agriculture (IITA) is an African-based international organization that conducts research for development and is dedicated to the development of technologies that can assist with agricultural production at a local level and generate wealth while reducing consumer and producer risk. Their focus is not OVC, but some of their products could be beneficial to planners wanting to incorporate agricultural and food security data into their evaluation and planning for OVC efforts.

The IITA conducted a Rural Livelihood Study to assess the livelihoods and food security status of the rural poor in Nigeria, among other objectives. As part of the study, they developed a national poverty estimate at the LGA level. This data could potentially be helpful in assessing the relationship between poverty and OVC.



MAP 5 POVERTY AND ORPHANS NIGERIA

The green shading on Map 5 shows the poverty estimates by LGA, while the red dots illustrate the percentage of children who are orphans in each state. Even though the two data sets are at two different scales, state and LGA, this map can still assist decision makers. For instance,

Benue state in the south-east has many LGA's that are relatively rich, yet the percentage of orphans in the state is relatively high. Kaduna state in the north central part of the country has many LGA's that are relatively poor, yet the percent of orphans in the state is relatively low.

Decision makers can use these maps, in conjunction with other data as a decision support tools to investigate further why some of the states which have relatively richer areas have a higher orphan percentage than states which have relatively poorer LGAs.

SUMMARY

The examples above are not an exhaustive overview of all the information a decision maker might use to support OVC program decisions, but they show how maps can be a valuable decision support tool. Maps can show geographic trends in the data as well as highlight patterns in the data that may be inconsistent with expectations and require additional investigation.

ANNEX C:
CASE STUDY: USING GOOGLE EARTH TO LOCATE SERVICE SITES

CASE STUDY: USING GOOGLE EARTH TO LOCATE SERVICE SITES

The CDC PEPFAR Team in Côte d'Ivoire has developed an innovative approach to locating OVC service locations that take advantage of new software options for mapping. This approach, which could be replicated in other settings, is described below.

COTE D'IVOIRE OVC CONTEXT

OVC issues within Côte d'Ivoire are administrated by the national ministry, *Programme National des Orphelins et Autres Enfants rendus Vulnérables du fait du VIH/SIDA,* abbreviated PN-OEV. Services to OVC in the country are coordinated by the ministry through ***platforms***. These platforms are social centers and other sites that administer and manage OVC assistance in an area. NGO's implement the programs and provide reporting data to the platforms who in turn report back to PN-OEV.

The PEPFAR team in Côte d'Ivoire support PN-OEV's efforts through technical assistance, and staff support.

IDENTIFYING LOCATIONS OF PLATFORMS

Though these platforms are the front line for OVC efforts in an area, their location had never been collected. Abdou Salam Gueye, MD, PhD, MPH, the Strategic Information Liaison for PEPFAR Côte d'Ivoire developed an innovative approach to locate the platforms as well as other PEPFAR service sites such as ART Treatment facilities. Dr. Gueye, used a free mapping program, Google Earth and knowledgeable informants to identify locations of the platforms.

"MAPPING PIZZA PARTY"

Dr. Gueye identified people who were knowledgeable about the location of the platforms, such as drivers supporting PEPFAR or PN-OEV activities or staff familiar with a town where a platform was located. These informants were then invited to a "pizza party" and asked to identify in Google Earth where platforms and other PEPFAR service sites were. Informants who identified locations of 2 sites were given a drink, while participants who identified the location of 3 sites were given a drink and a slice of pizza. As sites were identified, a point was added in Google Earth and labeled with the name of the platform. When there was a question or conflict about the location, Dr. Gueye included a notation about the conflict so that it could be resolved later either by additional investigation with informants or with GPS point collection.

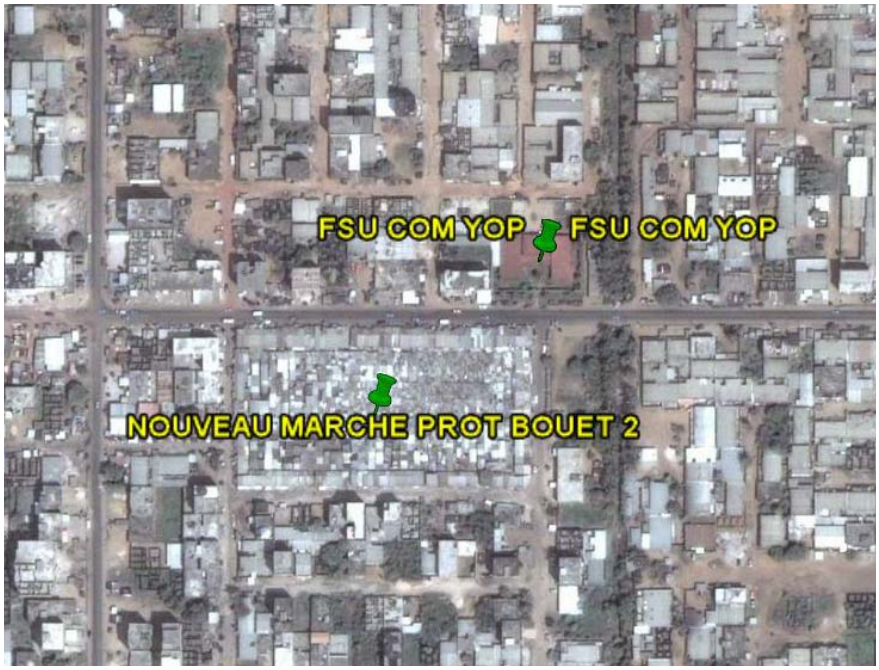


FIGURE 9 – GOOGLE EARTH SCREEN SHOT OF TWO LOCATIONS

Once the sites were all identified and validated, they were converted into a shapefile to facilitate their use in a GIS and the results were used for PEPFAR decision making as well as shared with the government of Côte d'Ivoire.

GOOGLE EARTH BACKGROUND

Google Earth is a free, mapping program available from Google, Inc. (http://earth.google.com/). It requires an internet connection and computer with 3D capable video card (most computers purchased in the last 2-3 years should have such a card). The advantages of Google Earth are that it is easier to learn to use than other mapping applications, and it is cheaper than other mapping programs (there is a free version available). The main disadvantage of the application is it's limitation as a mapping program. It is a data display tool only and does not provide a way to map data from databases or spreadsheets. In order to map data it is necessary to use a third piece of software such as a GIS, or MEASURE Evaluation's Excel to Google Earth Macro (http://www.cpc.unc.edu/measure/) to convert data into a format that Google Earth can read. An additional limitation is the lack of high resolution images for certain areas. In those areas where there are clouds (FIGURE 11) or low resolution images (FIGURE 12) it will not be possible to visually identify specific locations.

FIGURE 10 -- CLOUDS IN GOOGLE EARTH

FIGURE 11 -- LOW RESOLUTION IMAGES

Issues which can limit Google Earth's Functionality

LESSONS LEARNED AND APPLICABILITY IN OTHER SETTINGS

Google Earth can be a valuable tool for locating points of interest as well as validating locations obtained from other sources. The ease of use of Google Earth means that little training is necessary to use the program. These factors mean that a directed process of locating object using knowledgeable informants, such as was done in Côte d'Ivoire can be a way to build a spatial database of PEPFAR locations. There are some important considerations however when taking this approach:

- Identify knowledgeable informants
- A simple training and orientation to the software as well as map reading skills is necessary to ensure that the knowledgeable informants can correctly locate sites.
- There should be a process for resolving conflicts that might arise when there is disagreement among knowledgeable informants about locations of sites.
- There should be a validation process for the locations, either by having informants confirm each others' locations or through other resources.
- Once sites are located and validated, it will be necessary to use an additional software program to produce maps that display attributes for the sites.

SUMMARY

One of the findings of the interviews with USG staff was that most saw mapping as a valuable decision support tool, however the costs associated with software and training limited its use in many countries. Google Earth represents a new option for using mapping as a decision support tool. When properly structured data exists, Google Earth can be an effective tool for displaying

data and for building new data sets, such as was done in Côte d'Ivoire. However, Google Earth is not a replacement for a GIS. Its limitations mean that it should be part of an integrated mapping decision support suite of tools.

ANNEX D:
MAKING DATA SUITABLE FOR MAPPING

OVC DATA AND SUITABILITY FOR MAPPING

PEPFAR reporting requirements for OVC data mandate the following information be reported at a country level: total numbers of OVC's served (direct and indirect), caregivers trained and monies spent. However PEPFAR guidance encourages countries to allocate funds necessary to collect data beyond these three indicators in order to effectively monitor and evaluate OVC programs (United States Office of Global AIDS Coordinator, 2006). To that end, mapping OVC programs and population in need make use of lower level reporting and other data beyond the PEPFAR mandated indicators.

The way the data is stored in a file is known as its schema. Providing a full overview of proper database schemas can be difficult since the types of available data vary from country to country. However, the following points should be considered when mapping data and are the basis for the evaluation of the data that follows.

MAPPING SCHEMA

Even though data structures can vary, there are some universal guidelines for data to ensure it can be mapped. First, for the phenomenon being mapped, data should be available in a way that allows them to be tied to a specific geographic feature, such as a town or district. For instance, knowing that organization X serves 12 OVC without knowing where organization X provides the service means that these data cannot be mapped. But if it is known that organization X serves 12 OVC in a school in a specific town allows that information to be mapped because it is tied to a specific location (a town).

GEOGRAPHIC IDENTIFIER

Adding a geographic identifier to OVC programs can be accomplished in multiple ways, from using GPS receivers to collect a latitude/longitude coordinate for an actual program site location to using a gazetteer to identify a coordinate for a town where IPs operate. For those programs which may not have a specific location, simply knowing the district or region where they operate will allow mapping. It is important to remember that using the smallest administrative unit as possible will produce more useful maps. Lastly, perhaps the easiest way to add a geographic identifier is to ask IP's to identify where they are operating.

Putting data into a GIS or mapping program requires the data be structured in a specific way, for instance there should be one record per geographic unit. Often PEPFAR data are not structured this way, so it is sometimes necessary to process the data further and restructure the format to allow them to be useful in a GIS. Annex E provides an illustration about proper data structures for GIS. However, the following are general rules that apply to formatting data that are to be mapped.

RULES FOR FORMATTING DATA

1) **There should be one record per geographic unit** – GIS programs require each individual geographic feature to correspond to a record in a data table.
2) **Each geographic unit in the GIS should have a unique identifier** – it is most preferable that this unique identifier be something other than the feature's name. The US Government has developed a set of unique codes for most of the world's administrative units such as region or districts, known as FIPS codes. More information can be found here: http://geonames.usgs.gov/foreign/index.html
3) **The OVC data should be tied to the geographic data via a unique id** – this means that it may be necessary to add a field to the data table that matches the geography feature's unique id. As mentioned previously, the feature's name is not a reliable unique id due to spelling variations and problems that can arise due to characters that are specific to certain languages.
4) **Variable names for OVC data should be unique and conform to software's requirements** – each GIS has requirements about variable names. Many programs enforce an eight character limit and all will require unique variable names.

GEOGRAPHY FILES

Once the data have been formatted to a proper GIS schema, they can be brought into a GIS and linked with geography boundary files. Geography boundary files are the representations of features such as administrative boundaries, towns or cities that the OVC data will be linked to, these boundary files are sometimes referred to as shape files because that is a common file format for these file types. In nearly all cases, geography boundary files will follow a standard schema: one record per geographic unit and will contain a unique id for each geographic feature. Following a standardized schema will allow a GIS data file such as OVC program data to be linked with geography files if the schemas for the two files match. Once the two files have been joined, the data can be mapped. Annex E provides a generic illustration of this process, however the actual steps necessary will vary by GIS software program, so it is recommended that readers consult the documentation for the GIS program they are using for the specific steps.

SUMMARY

In order to make maps, it is necessary to have data that can be mapped. When data doesn't conform to data schema best practice, it is necessary to clean or reformat the data so that it can be mapped. This process can add delays and introduce errors. It is preferable to structure data properly when data is first created. An additional benefit to adhering to data schema best practice, is that it makes it easier for non-mapping programs such as spreadsheet and database programs to use the data.

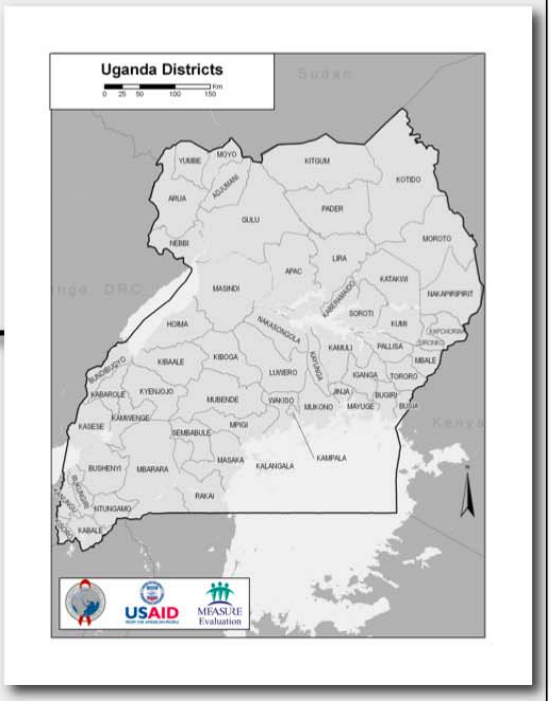
ANNEX E
ADDING DATA INTO A GIS

GIS Data Schema

This table represents the data table that would be present in a GIS. Each record (row) is tied to a geographic feature on the map (district in this case). Data will need to be added to the table in order to produce a map.

GIS data table with district names

FIPS Code	District Name
UG65	ADJUMANI
UG26	APAC
UG77	ARUA
UG66	BUGIRI
UG28	BUNDIBUGYO
UG29	BUSHENYI
UG67	BUSIA
UG30	GULU
UG31	HOIMA
UG78	IGANGA
UG61	RAKAI
UG93	RUKUNGIRI
UG94	SIRONKO
UG95	SOROTI
UG74	SSEMBABULE
UG76	TORORO
UG96	WAKISO
UG97	YUMBE



FIPS Code is a unique identifier code for a district. The US Dept of State Office of the Geographer has assigned a unique FIPS code for every administrative unit. USG regulations require the use of FIPS code as a unique identifier

Join the two tables to bring into a GIS

The table at the right represents a sample data table that might exist for a country. It shows by district, the total population and the number of orphans.

In order to map it, it must be brought into the GIS. This can be accomplished by joining the data table with the GIS table in the GIS. In order to perform a join, it is necessary to have a field that is common to both tables. The only common field between the GIS table and the data table is *District Name,* however using a text field such as *District Name,* can be problematic due to variability in spellings. It is recommended that a new field be added for the FIPS code and the two tables be joined with the FIPS code serving as the common field.

District Name	Total Population	Number of Orphans
ADJUMANI	201,493	23,584
APAC	676,244	29,525
ARUA	855,055	48,454
BUGIRI	426,522	21,393
BUNDIBUGYO	212,884	12,821
BUSHENYI	723,427	60,981
BUSIA	288,181	16,880
GULU	468,407	44,216
HOIMA	349,204	20,310
IGANGA	716,311	33,378
RAKAI	471806	49808
RUKUNGIRI	308696	27258
SIRONKO	291906	13608
SOROTI	371986	27901
SSEMBABULE	184178	15540
TORORO	559528	32198
WAKISO	957280	81467
YUMBE	253325	20906

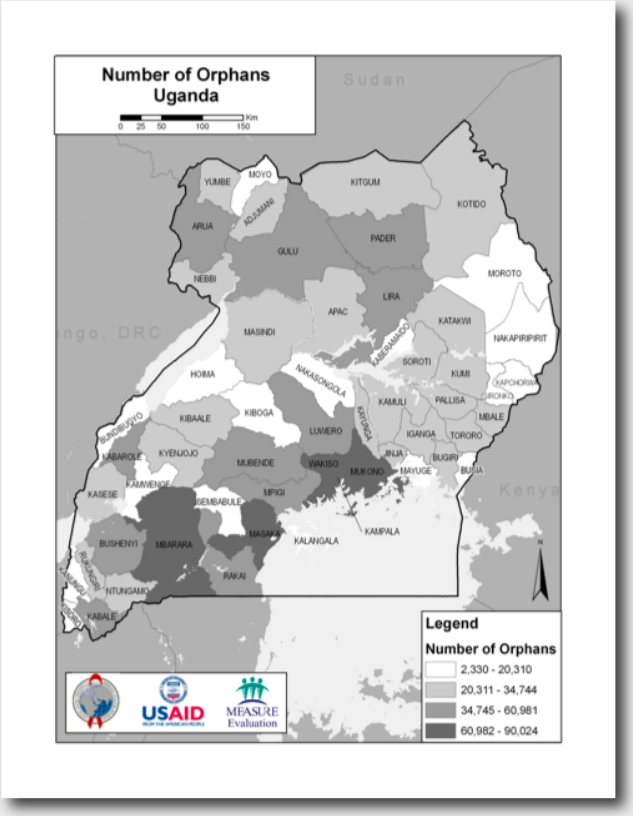
OVC data table showing number of orphans and total population

FIPS Code	District Name	Total Population	Number of Orphans
UG65	ADJUMANI	201,493	23,584
UG26	APAC	676,244	29,525
UG77	ARUA	855,055	48,454
UG66	BUGIRI	426,522	21,393
UG28	BUNDIBUGYO	212,884	12,821
UG29	BUSHENYI	723,427	60,981
UG67	BUSIA	288,181	16,880
UG30	GULU	468,407	44,216
UG31	HOIMA	349,204	20,310
UG78	IGANGA	716,311	33,378
UG61	RAKAI	471806	49808
UG93	RUKUNGIRI	308696	27258
UG94	SIRONKO	291906	13608
UG95	SOROTI	371986	27901
UG74	SSEMBABULE	184178	15540
UG76	TORORO	559528	32198
UG96	WAKISO	957280	81467
UG97	YUMBE	253325	20906

Joined table contains the data from the OVC data table attached to the GIS data table. This allows the data to be mapped.

The joined table above represents the new GIS table. It has been joined on the field *FIPS Code*. A map showing number of orphans can now be produced.

Note: The specific steps necessary for the join and the variable name requirements will vary from software to software. Refer to the mapping program's manual for specific steps on the process.



RESOURCES AND WORKS CITED

RESOURCES

Below are resources that can provide more information about spatial tools and how to use them to support OVC decision making

PEPFAR

There is not a single approach to including mapping and data infrastructure strengthening activities in PEPFAR country operational plans. Each country's specific circumstances will help decide what approach makes sense. Technical assistance on planning for mapping activities is available from OGAC. Additionally there are resources on the PEPFAR Extranet Map Library on the use of GIS and mapping.

MEASURE EVALUATION

MEASURE Evaluation can provide additional guidance on DDIU strategies as well as support and guidance on the use of spatial tools and mapping

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

SPATIAL TOOLS

Google Earth -- http://earth.google.com/ -- Google Earth is a free program that can display data geographically. Google Earth requires an internet connection to work.

ArcGIS and ArcReader -- http://www.esri.com/ -- ArcGIS is a geographic information system, ArcReader is a free data display tool.

PEPFAR Spatial Data Repository -- http://www.hivspatialdata.net/ -- an online resource for PEPFAR spatial data. In addition to data submitted by OGAC, users can submit their own data as well.

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