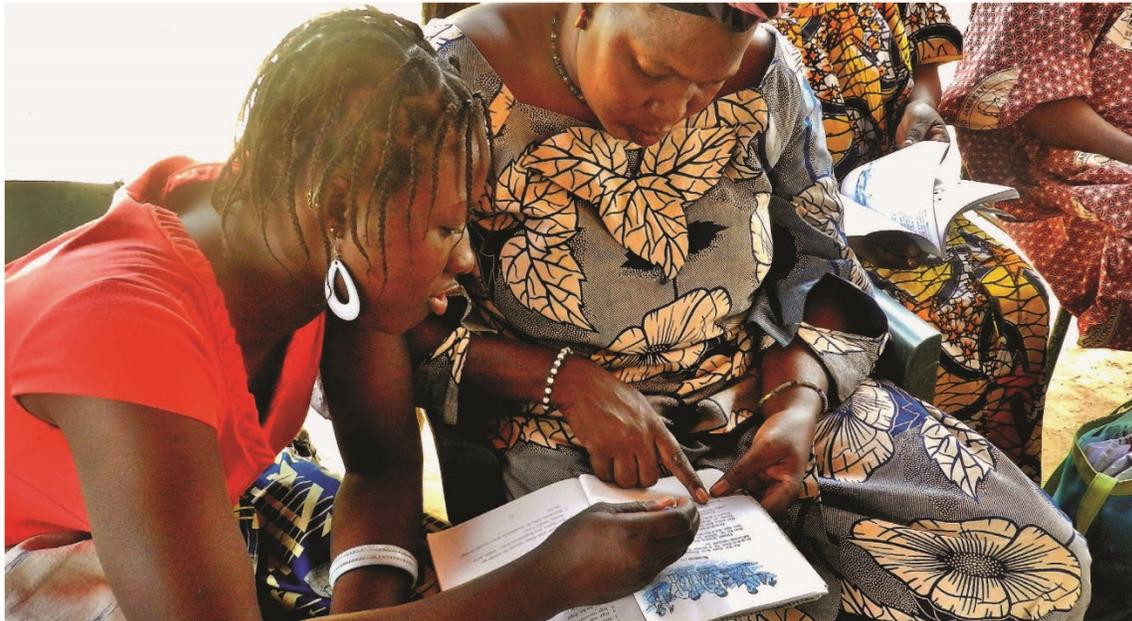




**FEED THE FUTURE**  
The U.S. Government's Global Hunger & Food Security Initiative

# PERFORMANCE MONITORING

## FACILITATOR'S GUIDE



**USAID**  
FROM THE AMERICAN PEOPLE

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August 2016

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## H. Materials, Supplies and Checklist

### Session Materials

#### Session Six

- PowerPoint slides
- Gantt Chart poster
- Gantt Chart Activity Cards in three colors (e.g., orange for steps 1-13; green for steps 14-26; turquoise for steps 27-39)
- Butcher block paper (enough to diagram four indicator diagrams)
- Markers
- Tape
- Indicator definition sheets for female beneficiary dietary diversity and for hectares under improved technology or management (in participant guide)
- 3- 6 laptops with Data Error handouts loaded on each laptop
- Data Errors Handouts
  - Aredonia Household (Word)
  - Aredonia Agricultural Production (Excel - copies of all spreadsheets within the workbook)
  - Aredonia Technologies (Excel - copies of all spreadsheets within the workbook)
- Prizes for team members who find the 10 data errors
- Translation protocol
- Field exercise
  - GPS units of varying types (with extra batteries)
  - Tape measure
  - Marbles
  - Google earth sketch of plot to be measured
  - Handouts for field exercise (in participant guide)
    - Group exercise instructions
    - How to calculate an area in the field
    - GPS Field Protocol
    - How to calculate the area of a triangle.
  - Bottled water for participants for field exercise

## Supplies

*Have the following standard office supplies available:*

- Pads of paper
- 5 x 7 index cards (different colors)
- Extra Pens
- Mr. Sketch markers (for facilitators and each table)
- Colored felt-tipped pens (for each table)
- Masking tape or painter's tape
- Suction cups for banners
- Paper clips
- Stapler and staples
- Scissors
- Post-It Notes (3x3, different colors)
- Chocolate (a must!!!)

## Equipment

- LCD project and screen
- Laptop loaded with course PowerPoint slides
- Internet access
- Speakers
- Remote for LCD projector/PowerPoints and extra batteries
- Microphones (if necessary)
- Flipchart stands and paper (one stand per table plus two stands for facilitators)
- Chimes to ring at breaks
- Camera for photos during session
- Note: Additional laptops are needed for individual sessions (see session list of materials)

## Session 6: Collecting Performance Monitoring Data

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- Session Goal:** Understand how to collect good quality quantitative performance monitoring data
- Learning Objectives:**
- Become cognizant of essential tasks and timelines for implementation of a household survey
  - Extract essential information requirements from indicator definitions
  - Translate indicator data requirements to a data collection instrument (survey questionnaire)
  - Measure plot area using GPS and pacing methods
  - Understand core survey sampling concepts: bias and precision
- Session Length:** 390 minutes
- Session Materials:**
- Session 6 slides
  - Gantt Chart
  - Gantt Chart Activity Cards in three colors (e.g., orange for steps 1-13; green for steps 14-26; turquoise for steps 27-39)
  - Indicator diagram chart
  - Butcher block paper (enough to diagram three indicators)
  - Markers
  - Tape
  - Indicator definition sheets for female beneficiary dietary diversity and for hectares under improved technology or management
  - Data Errors
    - Handout - Aredonia Household (Word)
    - Handout - Aredonia Agricultural Production (Excel)
    - Handout - Aredonia Technologies (Excel)
    - Prizes for team members who find the 10 data errors
  - Translation protocol
  - Field exercise
    - GPS units of varying types (with extra batteries)
    - Tape measure
    - Marbles
    - Google earth sketch of plot to be measured
  - Handouts for field exercise
    - Group exercise instructions
    - How to calculate an area in the field
    - GPS Field Protocol
    - How to calculate the area of a triangle.
  - Bottled water for participants for field exercise

**Facilitator Notes:**

Time & Facilitator	Content/Activities	Materials																																												
Prior to the Session	<p><b>Preparing the classroom:</b></p> <p>Post the Gantt Chart poster on the wall.</p> <table border="1" data-bbox="349 422 1430 533"> <thead> <tr> <th rowspan="2">#</th> <th rowspan="2">Activity</th> <th rowspan="2">Deliverable</th> <th colspan="12">Time</th> </tr> <tr> <th>Jan</th> <th>Feb</th> <th>Mar</th> <th>Apr</th> <th>May</th> <th>Jun</th> <th>Jul</th> <th>Aug</th> <th>Sep</th> <th>Oct</th> <th>Nov</th> <th>Dec</th> </tr> </thead> <tbody> <tr> <td> </td> </tr> </tbody> </table> <p>Post three large pieces of butcher block paper on the wall. You will be using the paper to diagram indicators in the session.</p> <p><b>Additional preparation:</b> Familiarize yourself with the instructions for the field exercise, Measuring and Estimating Area. If it is a very hot day, have water for the participants.</p>	#	Activity	Deliverable	Time												Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec																		<p>Gantt Chart Poster</p> <p>Three large sheets of butcher block paper</p> <p>Markers</p> <p>Tape</p>
#	Activity				Deliverable	Time																																								
		Jan	Feb	Mar		Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec																																

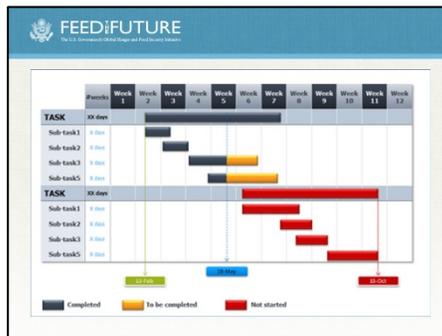
Time & Facilitator	Content/Activities	Materials
<p>9:00 am (15 min.)</p>	<p><b>Start of the Day</b></p> <p>Welcome participants back to the course. Ask for any “overnight thoughts” about the previous day’s material.</p> <p>Share the agenda for the day.</p> 	
<p>9:15 am (60 min.)</p>	<p style="text-align: center;"><b>Slide 1</b></p>  <p><b>Overview of Data Collection</b></p> <p>Say: So you’ve decided you need to field a survey to collect data for your performance monitoring indicators. Let’s put together the steps involved in implementing a survey, and an approximate timeline for implementation using a Gantt chart. Remember, regardless of whether your survey will cover one district or the whole country, the same basic steps will be involved – so today’s training really builds your capacity to collect representative data at many different levels.</p> <p>Ask: Has anyone worked with Gantt Charts before?</p> <p>Ask those who have worked with a Gantt Chart: What is the purpose of the chart and what are the key elements in the chart?</p>	

**Slide 2**



Answer: A Gantt chart shows you what has to be done (the activities) and when (the schedule). A Gantt chart, commonly used in project management, is one of the most popular and useful ways of showing activities (tasks or events) displayed against time. Here we will use a Gantt Chart to track the process – which can be thought of as a project – to collect data.

**Slide 3**



On the left of the chart is a list of the activities and along the top is a suitable time scale. Each activity is represented by a bar; the position and length of the bar reflects the start date, duration and end date of the activity. This allows you to see at a glance:

- What the various activities are
- When each activity begins and ends
- How long each activity is scheduled to last
- Where activities overlap with other activities, and by how much
- The start and end dates for the whole project

**Plenary Activity: Outline the Activities Needed to Implement a Survey**

Directions:

- Randomly distribute the 39 activity cards so that all participants have the same amount of cards (approximately 2 to 4 per participant) except for the first two activities
  - #1 – Inception visit
  - #2 – Prepare the study design and accompanying implementation plan
- Post the first two activities on the Gantt Chart
- Tell the participants to post the remaining activities on the Gantt in the correct order
- When all the cards are posted, have a participant read out the final order of activities
- Discuss the order and let participants make changes

- Gantt Chart Poster
- Activity Cards

Answer: The correct order is as follows; note that for some items, order is approximate:

#	Activity	Deliverable
1	Inception visit	Inception visit report (final)
2	Prepare the study design & accompanying implementation plan	Protocol (draft, final)
3	Prepare the sampling design	Sampling design memo (draft, final)
4	Prepare the analysis plan	Analysis plan (draft, final)
5	Questionnaire design	Questionnaire(s) (draft, pretest, pilot, final fielded)
6	Questionnaire translation	Translation protocol; translated questionnaires (pretest and final fielded)
7	Establish range values and prepare unit conversion tables	File indicating which questionnaire items will have range checks, and what the ranges will be (draft, final); Excel file indicating local units of measure and conversion factors (to make equivalent to standard units of measure)
9	Questionnaire programming (either for tablets or for data entry program)	Questionnaire programming plan and timeline
10	Obtain ethical review and approval from federal wide-certified IRB	Ethical review plan and timeline
11	Develop and issue RFP (if required); review submissions; subcontract to local data collection org	RFP (draft, final); detailed fieldwork implementation plan, including team structure and fieldwork timeline and logistics
13	Develop pretest and pilot protocols	Pretest and pilot protocols with detailed timeline (draft, final)
14	Material provisioning (e.g., scales, measuring boards, iodine test kits, etc.)	Ordering plan and timeline, to include customs management plan if supplies are being shipped to country
15	Preparation of manuals (interviewer, supervisor, fieldwork, etc.)	
16	Develop field check tables	Field check table shells (draft, final)

17	Prepare data structure and codebook	Presentation on structure of the data file and on expected format of the codebook
18	Develop and code programming specifications (tablets only)	Presentation on how the interviewer will move through the questionnaire, including how multiple iterations will be handled
19	Develop interviewer training plans and supporting materials	
20	Develop data monitoring plan	Data monitoring plan (draft, final)
21	Develop fieldwork management and monitoring plan	Detailed fieldwork management and monitoring plan (draft, final), with regular progress reports throughout fieldwork
22	Implement questionnaire pretest	Questionnaire pretest report
23	Implement training of trainers (TOT)	--
24	Implement pretest (as part of TOT)	TOT and pretest report
25	Implement main training	--
26	Implement all-systems fieldwork pilot, including data entry/management (as part of main training)	Main training and pilot report; Data entry/data management pilot report
27	Implement data entry/data management pilot as part of all-systems fieldwork pilot	Data entry/data management pilot report
28	Implement fieldwork	Minimum once per week fieldwork report, plus summary fieldwork report at end of data collection activities
29	Generate field check tables	Minimum once per week field check table submission
30	Prepare data cleaning plan	Data cleaning plan (draft, final)
31	Prepare data weighting protocol	Data weighting protocol (draft, final)
32	Weight the data	Memo advising that the weighting of the data has been completed according to protocol

	33	Clean the data	Memo advising of data cleaning steps implemented according to plan, and notable findings during the cleaning process	
	34	Preparation of data quality assessment memo	Memo to include response rates, final set of field check tables and interpretation of key findings, and any other pertinent information regarding the quality of the data	
	35	Preparation of final report, including tables and text	Final report (draft, final)	
	37	Prepare internal use data files (maintains some PII, e.g., GPS coordinates)	Internal use data file	
	38	Prepare protocol for rendering data suitable for public use	Public use protocol (draft, final)	
	39	Prepare public use data files (excludes PII)	Public use data file	

Time & Facilitator	Content/Activities	Materials
10:15am (15 min.)	<b>Break</b>	
10:30am (5 min.)	<p><b>Concluding Comments on Creating Survey Implementation Plans</b></p> <p>Say: Once you create your Gantt Chart, it becomes a tool for managing the implementation of your data collection activity. This Gantt Chart shows how you can use color to track the progress of your project. You can also add roles and responsibilities, and start dates and end dates to track which activities can be run in parallel and which need to be done sequentially.</p> <p style="text-align: center;"><b>Slide 4</b></p> <div data-bbox="667 604 1112 936" data-label="Image"> <p>The slide features the FEEDiFUTURE logo at the top left. The main text reads: "Remember: Careful planning of data collection activities is critical. Any mistakes made early in the process, once made, cannot be corrected further down the line because each step builds on the last. Measure twice..." To the right of the text is a photograph of a woman in a striped shirt and a man in a blue shirt working together to build a wooden structure outdoors. The woman is standing and pointing at the structure, while the man is kneeling and working on the base.</p> </div> <p>Say: Careful planning for a survey is critical. Any mistakes made early in the process, once made, can't be corrected further down the line – each step builds on the last – so quality control at every step is essential for collection of good quality data that can be used for programmatic decision-making, monitoring, and evaluation. Be like a carpenter who knows that they have to measure the wood twice before starting to cut: review your work at each step and make sure it is being done correctly, because you can't go back and fix mistakes later.</p>	
10:35 am (25 min.)	<p><b>Plenary Activity: “Diagramming” the indicator</b></p> <p>Say: Now we're going to talk about how to really understand your data collection needs: What pieces of information do your indicators require – both to feed up for reporting needs, but also to feed in, to support really good learning and adaptive management.</p> <p>So who in this room remembers the most painful part of 8th grade grammar class, sentence diagrams? OK, for those who never had the delightful opportunity to diagram sentences, don't worry, you'll catch on. The point of this exercise is just to help us map out the pieces of information we need to extract from our indicator definitions in order to ensure we capture all the requisite pieces of information we need to report accurately on our indicators.</p> <p style="text-align: center;"><b>Slide 5</b></p> <div data-bbox="667 1558 1112 1892" data-label="Image"> <p>The slide features the FEEDiFUTURE logo at the top left. The main text reads: "'Diagramming' your indicators ...or, how to identify all of the pieces of information you need to collect to report on your indicator". Below the text is a diagram showing a sentence "Diagramming an indicator shows the structure behind the measure words" with lines connecting words to their grammatical functions. "Diagramming" is connected to "shows", "an" to "the", "indicator" to "structure", "the" to "behind", and "measure words" to "the".</p> </div>	

	<p>Say: So what we're going to do is walk through the process of diagramming our indicators in a similar way to how we would diagram a sentence. As you may recall, the purpose of diagramming a sentence is so you can see the structure of the sentence behind the words. And we will be doing the same thing with regard to indicators: diagramming indicators to show the structure behind the measure.</p> <p>We're really not trying to make you re-live those difficult if not traumatic middle-school grammar lessons. The point is just to take a little bit of time to inventory the pieces of information that you need both to understand the structure and content of indicator itself, and to design the questionnaire that will be used to collect the necessary information.</p>	
	<p>Say: We'll have two exercises: First we'll walk through one together, and then you'll have a chance to do one on your own. Don't get too stressed about, e.g., "does the subject go here, or is it the verb!?" or, "Is the line on top of the other line supposed to be straight up and down, or is it at an angle!?"</p> <p style="text-align: center;"><b>Slide 6</b></p> <div data-bbox="667 709 1112 1045" style="border: 1px solid black; padding: 10px; margin: 10px auto; width: fit-content;">  <p><b>INDICATOR EG.3.3-10:</b> Percentage of female direct beneficiaries of USG nutrition-sensitive agriculture activities consuming a diet of minimum diversity</p> <p>Starting point: The woman ate foods.</p> <p>Add details on: Who, what, where, when?</p> </div> <p>Say: OK! So for the first exercise, we're going to use a brand-new indicator, "Percentage of female direct beneficiaries of USG nutrition-sensitive agriculture activities consuming a diet of minimum diversity."</p> <p>First thing we have to do is restate the indicator in normal language. Nobody talks like this! What is the simplest/most basic expression of the idea this indicator is trying to communicate? Let's say it's "The woman ate foods." Remember, to get the data for this indicator, we basically have to ask these beneficiaries what they eat, so this approach of rearticulating the indicator as a basic expression that make sense in English really helps you organize your thinking at the right level, and prepares you to develop your questionnaire.</p> <p>Directions to facilitator: On the butcher block paper, start diagramming the indicator:</p> <p style="text-align: center; background-color: yellow;"><b>[diagram the first part of the sentence: woman   ate   foods]</b></p> <p>Say: Next, we need to make sure we get all the details in there. For example, it's not enough to ask our questionnaire of "a woman" in the household. We have to make sure it is the right woman for the purposes of our indicator: she has to be "eligible" to respond. So we have to ask ourselves the "w" questions: who, what, when, where – these will provide the <b>eligibility criteria</b>.</p> <p>So let's start with our selected respondent. Let's have a look at the PIRS sheet and see whether the selected beneficiary in this household is eligible.</p> <p>Ask: What are the eligibility criteria for this respondent? We already know that our respondent is female; what else do we already know?</p> <p><i>Answer: She is a direct beneficiary, because this is a beneficiary-based survey.</i></p>	<ul style="list-style-type: none"> <li>• Butcher paper for diagramming the sentence</li> <li>• Tape</li> <li>• PIRS sheet</li> </ul>

Ask: OK, so she's a beneficiary of FTF activities, but what kind of activities does she need to participate in to be eligible to contribute to this indicator?

Answer: She has to be a direct beneficiary of nutrition-sensitive ag activities.

[Add "the," "direct beneficiary of nutrition-sensitive agriculture activities" to the paper]

Ask: Sometimes age is a criterion for eligibility. What does your indicator definition sheet say about age as an eligibility criterion? Even if age is not a criterion for eligibility, how else might it matter for the survey operation?

Answer: Informed consent by parent/guardian and assent required for all respondents under age 18; if the woman is under age 18 and does not reside with a parent or guardian, she may not be able to respond to the interview at all.

Ask: Ok, now next, we know that our program is encouraging women to eat a variety of foods for optimal nutrition – let's go back to our "w" questions: What does our PIRS sheet say about when the woman should have eaten these foods?

Answer: Yesterday, during the day or night – in other words, the past 24 hours.

Finally, the PIRS sheet says that the indicator is measuring whether a woman has a minimum amount of diversity in her diet.

Do we ask her "Did you eat from diverse food groups yesterday"? No...

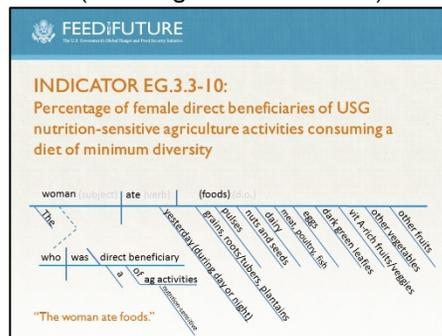
Ask: What do we need to ask her? What foods should be asked about?

Answer: We need to know which foods the woman ate.

Add kinds of foods.

Ask: What about disaggregates for this indicator?

### Slide 7 (Final diagrammed indicator)



Show slide to summarize the activity.

Time & Facilitator	Content/Activities	Materials
<p>11:00 am (30 min.)</p>	<p><b>Independent exercise: “Diagramming” the indicator</b></p> <p style="text-align: center;"><b>Slide 8</b></p> <div data-bbox="667 373 1110 705" style="border: 1px solid black; padding: 10px; margin: 10px auto; width: fit-content;">  <p><b>INDICATOR EG.3.2-18:</b> Number of hectares under improved technologies or management practices <i>(independent practice)</i></p> <p><b>Starting point:</b> The farmer applied the technology/practice to crops on [x] hectares of land.</p> <p><b>Add details on:</b> Who, what, where, when?</p> </div> <p>Say: We’re going to use the indicator “Number of hectares under improved technologies or management practices,” with the example from the NUTSENAG case study. Also, keep in mind that we will be using this indicator example as the basis for working out a questionnaire design in the subsequent exercise, so make sure you really engage with this exercise so you can move easily into the questionnaire design exercise.</p> <p><b>Individual Exercise</b> Directions:</p> <ul style="list-style-type: none"> <li>• Individual exercise – participants diagram the indicator.</li> <li>• Ask for two participants to come to the butcher block paper and draw their diagrams.</li> </ul> <p><b>Debrief diagrams:</b> Say: First thing we have to do is restate the indicator in normal language. If our program to increase the use of improved tech/practices was successful in just one household, we would say “The farmer applied the technology/practice to crops on a certain number of hectares of land.” Remember, ultimately we will be asking the beneficiaries, household by household, whether they themselves applied these technologies or practices to their land. So it makes sense to rearticulate the indicator in plain English to align with how we will ask the questions to get the information we need.</p> <p style="text-align: center;"><b>[diagram the first part of the sentence: farmer   applied   technology/practice]</b></p>	<ul style="list-style-type: none"> <li>• PIRS sheet for number of hectares under improved technologies</li> <li>• NUTSEN AG case study</li> <li>• 2 Butcher block paper</li> </ul>

Say: Next, we need to make sure we get all the details in there. For example, it's not enough to ask our questionnaire of "a farmer" in the household. We have to make sure it is the right farmer for the purposes of our indicator. So we have to ask ourselves the "w" questions: who, what, when, where.

So let's start with our farmer. Let's look at the PIRS sheet and see what farmer in the household is eligible – what are the eligibility criteria – for our farmer respondent. Can the farmer be an indirect beneficiary? What about required disaggregates? What are the required disaggregates for this indicator?

[add "the," "direct beneficiary," and "male/female" ]

Say: Ok, we know that our program is encouraging farmers to apply improved technologies and practices – let's go back to our "w" questions: What are the technologies/practices going to be applied to? You can answer that in terms of crops, and in terms of area units of land. We also need to know when the technology was used in the field. What's the time frame required? One year. However, what else does the PIRS sheet say? It says that if the same piece of land was cultivated during more than one season using improved technologies or practices, we can count that same piece of land as many times as it was cultivated using improved practices within the past year. Because we're talking to farmers about agriculture, we want to talk to them in terms of their seasons, but we can put appropriate dates with those so that everyone has a clear understanding about which months of the year we are discussing, and so there is no overlap.

Discuss units issue, need for conversion table.

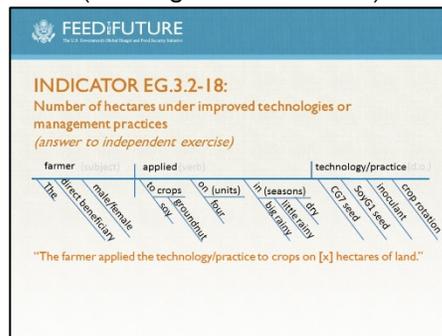
[add prepositions for crops, units of area, and seasons]

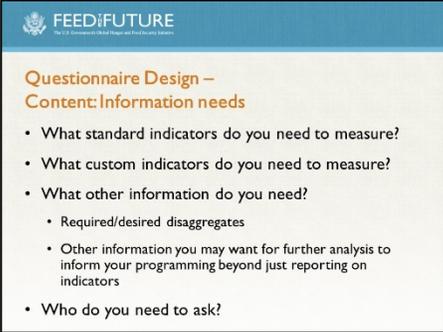
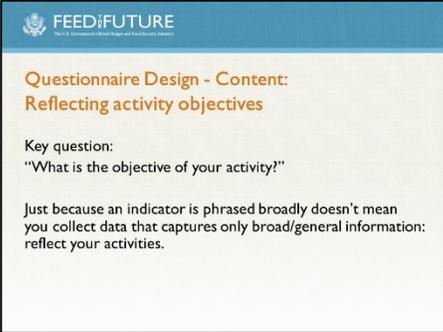
Say: Finally, we need to know about whether the farmer used an improved technology or management practice.

Ask: Is it enough to just ask, "Did you cultivate your plot using improved technologies?" Why or why not?

Answer: Need to *add technology types*.

**Slide 9**  
(final diagrammed indicator)



<p>11:30 am (60 min.)</p>	<p><b>Questionnaire Design and Development</b></p> <p style="text-align: center;"><b>Slide 10</b></p> <div style="text-align: center;">  </div> <p>Say: Now we have a plan for collecting our data. We've identified the indicators that we need to measure, and our next step is to determine how to collect the information required to calculate those indicators. We're at the point where we need to design our questionnaire.</p>	
	<p style="text-align: center;"><b>Slide 11</b></p> <div style="text-align: center;">  </div> <p>Say: What to ask yourself when you're getting started:</p> <ul style="list-style-type: none"> <li>• What standard indicators do you need to measure?</li> <li>• What custom indicators do you need to measure?</li> <li>• What other information do you need? <ul style="list-style-type: none"> <li>○ Required/desired disaggregates</li> <li>○ Other information you may want for further analysis to inform your programming beyond just reporting on indicators</li> </ul> </li> <li>• programming beyond just reporting on indicators</li> <li>• Who do you need to ask?</li> </ul>	
	<p style="text-align: center;"><b>Slide 12</b></p> <div style="text-align: center;">  </div> <p>Say: Yes, these indicators have been designed to be comparable across activity types for the purposes of reporting up, but they must also necessarily inform your own programming, so make</p>	<p>Facilitator needs to have an example of data they used to inform their adaptive approach to program mgmt</p>

	<p>sure the data you collect are data you can really use to inform your adaptive approach to program management. So for example, provide one example].</p> <p>Then ask: Who can provide another example of what a good question looks like, in terms of being both useful in reporting out and adaptive management for your own activity, vs. a not-as-good question using the NUTSENAG case study?</p> <p>Note: Have 2 or 3 participants provide examples.</p>	
	<p style="text-align: center;"><b>Slide 13</b></p> <div style="border: 1px solid black; padding: 10px; margin: 10px auto; width: fit-content;">  <p style="text-align: center;"><b>Questionnaire Design: Exercise</b></p> <p>INSTRUCTIONS:</p> <ul style="list-style-type: none"> <li>• Organize into groups of 3-4</li> <li>• Review the sample questionnaire and find 10 reasons why it can't be used to collect data for the "hectares under improved technology" indicator</li> <li>• First team with all 10 problems correctly identified wins a prize (!) 🎉</li> </ul> </div> <p>Say: Now, keeping in mind the indicator you just diagrammed on hectares under improved management/practice, I'm going to hand out a questionnaire with errors in it.</p> <p>Directions:</p> <ul style="list-style-type: none"> <li>• Divide into 3 to 4 groups</li> <li>• Identify 10 problems in the questionnaire and write them on your flip chart.</li> <li>• The first team with all 10 problems correctly identified wins a prize (!).</li> </ul> <p>Correct answer:</p> <ol style="list-style-type: none"> <li>1. In the household roster (section I), column 8 (eligibility), the eligibility criteria are not clearly reflected: it should refer explicitly to the direct beneficiary status of the respondent eligible for interview.</li> <li>2. In the household roster (section I), there is no column reflecting the sex of the household member. This means that we will not know for sure the sex of the direct beneficiary (which is required for sex disaggregation of indicators), and we will not know the sex composition of the household (which may not be explicitly required by the indicators, but is important information for further analysis and better understanding of the living conditions of the project's direct beneficiaries.</li> <li>3. The opportunity to report on use of improved technologies/practices on the beneficiary's land in different seasons does not exist; however, the indicator notes that if a piece of land is worked with improved tech/mgmt practices during, e.g., 2 seasons within a year, that area of land should be counted 2 times for the year, not just once. Therefore, it is necessary to collect data on use of agricultural land for each season within the year.</li> <li>4. In Module D-1 and D-2, the structure of the questionnaire does not allow the opportunity to report on more than one crop being planted in each plot. So it therefore doesn't allow for reporting of intercropping, polyculture, etc.</li> <li>5. In Module D-1, item D03, units of area are not specified alongside quantity. You must have units - and not just hectares, but also local units.</li> <li>6. Soy beans are not reflected in the crop list.</li> <li>7. Groundnuts are not reflected in the crop list.</li> <li>8. CG7 seed is not specified in Module J or elsewhere.</li> <li>9. Soy G1 seed is not specified in Module J or elsewhere.</li> <li>10. Inoculant is not specified in Module J or elsewhere.</li> </ol>	<p>Aredonia Household, Agricultural Production and Technologies</p> <p>Flip charts and markers for each team.</p> <p>Prizes</p>

Say: OK, so now that you've really engaged with the questionnaire, I want to share just a few additional key points with you about questionnaire design and development.

### Slide 14

**FEEDiFUTURE**  
The U.S. Department of Health and Human Services

**Questionnaire Design - Content:**  
**The Questionnaire Appraisal System** (Willis and Lessler 1999)

- Designed to assist in evaluating survey questions, and in finding and fixing problems
- Many improvements to questions can be made through the process of systematic appraisal
- Goal: improve efficiency of questionnaire review process
- Complements & improves pretest and pilot exercises

Say: The QAS is a very valuable tool designed to assist in evaluating survey questions, and in finding and fixing problems, before the questions go into the field.

Many improvements to questions can be made through the process of systematic appraisal.

The goal is to improve the efficiency of the questionnaire review process by providing developers with an easy-to-use method for identifying and correcting potential problems with draft questionnaire items.

The QAS is not a substitute for a questionnaire pretest or pilot exercise – but it is a time-saving tool to improve outcomes and utility of pretests and pilots, which take place at a very time-sensitive point in the survey.

Once the core questionnaire design team thinks it is done reviewing the content of the questionnaire, please share it with seasoned field staff, data management team leads, and data analysis leads for their rigorous review and comment. These team members will review the questionnaire from different points of view and will each pick up problems that others do not see.

Also: this should be a group effort – multiple layers of review from methods and subject matter experts should be performed, and formatting should be rigorously checked by your most detail-oriented, eagle-eyed staff. Education, communications, literature majors – people like this tend to be very good at this critical task.

### Slide 15

**FEEDiFUTURE**  
The U.S. Department of Health and Human Services

**Steps in the QAS**

- **STEP 1: READING:** Determine if it is difficult for the interviewers to read the question uniformly to all respondents.
- **STEP 2: INSTRUCTIONS:** Look for problems with any introductions, instructions, or explanations from the respondent's point of view.
- **STEP 3: CLARITY:** Identify problems related to communicating the intent or meaning of the question to the respondent.
- **STEP 4: ASSUMPTIONS:** Determine if there are problems with assumptions made or the underlying logic.
- **STEP 5: KNOWLEDGE/MEMORY:** Check whether respondents are likely to not know or have trouble remembering information.
- **STEP 6: SENSITIVITY/BIAS:** Assess questions for sensitive nature or wording, and for bias.
- **STEP 7: RESPONSE CATEGORIES:** Assess the adequacy of the range of responses to be recorded.
- **STEP 8: OTHER:** Look for problems not identified in Steps 1 - 7.

	<p>Review the steps on the slide adding information below:</p> <p><b>STEP 1 - READING:</b> Determine if it is difficult for the interviewers to read the question uniformly to all respondents.</p> <p>1a. <b>WHAT TO READ:</b> Interviewer may have difficulty determining what parts of the question should be read.</p> <p>1b. <b>MISSING INFORMATION:</b> Information the interviewer needs to administer the question is not contained in the question.</p> <p>1c. <b>HOW TO READ:</b> Question is not fully scripted and therefore difficult to read.</p> <p><b>STEP 2 - INSTRUCTIONS:</b> Look for problems with any introductions, instructions, or explanations from the respondent's point of view.</p> <p>2a. <b>CONFLICTING OR INACCURATE INSTRUCTIONS,</b> introductions, or explanations.</p> <p>2b. <b>COMPLICATED INSTRUCTIONS,</b> introductions, or explanations.</p> <p><b>STEP 3 - CLARITY:</b> Identify problems related to communicating the intent or meaning of the question to the respondent.</p> <p>3a. <b>WORDING:</b> Question is lengthy, awkward, ungrammatical, or contains complicated syntax.</p> <p>3b. <b>TECHNICAL TERM(S)</b> are undefined, unclear, or complex.</p> <p>3c. <b>VAGUE:</b> There are multiple ways to interpret the question or to decide what is to be included or excluded.</p> <p>3d. <b>REFERENCE PERIODS</b> are missing, not well specified, or in conflict.</p> <p><b>STEP 4 - ASSUMPTIONS:</b> Determine if there are problems with assumptions made or the underlying logic.</p> <p>4a. <b>INAPPROPRIATE ASSUMPTIONS</b> are made about the respondent or about living situation.</p> <p>4b. <b>ASSUMES CONSTANT BEHAVIOR</b> or experience for situations that vary.</p> <p>4c. <b>DOUBLE-BARRELED:</b> Contains more than one implicit question.</p> <p><b>STEP 5 - KNOWLEDGE/MEMORY:</b> Check whether respondents are likely to not know or have trouble remembering information.</p> <p>5a. <b>KNOWLEDGE</b> may not exist: Respondent is unlikely to know the answer to a factual question.</p> <p>5b. <b>ATTITUDE</b> may not exist: Respondent is unlikely to have formed the attitude being asked about.</p> <p>5c. <b>RECALL</b> failure: Respondent may not remember the information asked for.</p> <p>5d. <b>COMPUTATION</b> problem: The question requires a difficult mental calculation.</p> <p><b>STEP 6 - SENSITIVITY/BIAS:</b> Assess questions for sensitive nature or wording, and for bias.</p> <p>6a. <b>SENSITIVE CONTENT</b> (general): The question asks about a topic that is embarrassing, very private, or that involves illegal behavior.</p> <p>6b. <b>SENSITIVE WORDING</b> (specific): Given that the general topic is sensitive, the wording should be improved to minimize sensitivity.</p> <p>6c. <b>SOCIALLY ACCEPTABLE</b> response is implied by the question.</p> <p><b>STEP 7 - RESPONSE CATEGORIES:</b> Assess the adequacy of the range of responses to be recorded.</p> <p>7a. <b>OPEN-ENDED QUESTION</b> that is inappropriate or difficult.</p> <p>7b. <b>MISMATCH</b> between question and response categories.</p> <p>7c. <b>TECHNICAL TERM(S)</b> are undefined, unclear, or complex.</p> <p>7d. <b>VAGUE</b> response categories are subject to multiple interpretations.</p> <p>7e. <b>OVERLAPPING</b> response categories.</p> <p>7f. <b>MISSING</b> eligible responses in response categories.</p> <p>7g. <b>ILLOGICAL ORDER</b> of response categories.</p> <p><b>STEP 8 - OTHER PROBLEMS:</b> Look for problems not identified in Steps 1 - 7.</p> <p>8. Other problems not previously identified.</p>	
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### Slide 16



Animated slide

Say: There is a tendency to “just take the questions from XYZ standardized survey instrument” because “the questions *must* be good.”

Ask: Who can tell us some good things about using questions from other researchers' instruments?

Ask: Who can tell us some pitfalls that can occur as a results of using questions from other researchers' instruments?

Ask: Who can tell us what a validation study is, in the context of survey research?

### Slide 17



Say: You will need conversion tables for local units – whether they are units to measure quantity of land or to measure quantity of foodstuffs.

Conversion tables should be prepared in advance; do not ask respondents to convert in the field.

	<p style="text-align: center;"><b>Slide 18</b></p> <div data-bbox="651 264 1094 596" style="border: 1px solid black; padding: 5px;">  <p><b>Questionnaire Design:</b> <b>Formatting</b></p> <p>Importance of formatting for data quality:</p> <ul style="list-style-type: none"> <li>• Alignment</li> <li>• ALL CAPS vs. sentence case</li> <li>• Responses as proximate to questions as feasible</li> <li>• Intros to each question to explain what the next questions are about</li> <li>• Use of brackets and parentheses</li> <li>• Page numbers [x of y]</li> </ul> </div> <p>Say: Whether on paper or tablet, the way that the questions and responses appear to the interviewer makes a big difference to the quality of data.</p>	
	<p style="text-align: center;"><b>Slide 19</b></p> <div data-bbox="651 804 1094 1136" style="border: 1px solid black; padding: 5px;">  <p><b>Questionnaire Design:</b> <b>Standardization and translation</b></p> <ul style="list-style-type: none"> <li>• All questions have to be asked of the same eligibility-type respondent across every household, using the same words or properly translated versions thereof.</li> <li>• No translation on the fly!</li> </ul> </div> <p>Ask: Why do you think that All questions have to be asked of the same eligibility-type respondent across every household, using the same words or properly translated versions thereof.</p> <p>Refer to the translation protocol in the participant guide or handout.</p>	<p>Translation protocol</p>
	<p><b>Optional (but encouraged)</b> <b>Application Exercise</b></p> <p style="text-align: center;"><b>Slide 20</b></p> <div data-bbox="651 1402 1094 1734" style="border: 1px solid black; padding: 5px;">  <p><b>Individual Application</b></p> <p>Think about an FTF activity in which you will need to collect data...</p> <p>...draft a Gantt Chart for the activity</p>  </div> <p>Individual Activity</p> <ul style="list-style-type: none"> <li>• Refer participants to their participant guide</li> <li>• Draft a Gantt Chart and identify data collection tool they will use for an FTF activity in which they need to collect data</li> </ul>	

	<p>Pair Activity</p> <ul style="list-style-type: none"> <li>• Each partner shares their Gantt Chart</li> <li>• Partners ask questions/provide feedback</li> </ul> <p>Plenary Debrief</p> <ul style="list-style-type: none"> <li>• How did drafting a Gantt help you visualize and organize your data collection process?</li> </ul>	
<p>12:30 pm (60 min.)</p>	<p>Lunch</p>	
<p>1:30 pm (120 min.)</p> <ul style="list-style-type: none"> <li>• 20 min to prepare</li> <li>• 20 min walk</li> <li>• 60 min activity</li> <li>• 20 min walk</li> </ul>	<p><b>Transition to Measuring Area</b></p> <p style="text-align: center;"><b>Slide 21</b></p> <div data-bbox="647 669 1094 1005" data-label="Image"> </div> <p>Say: We commonly collect data measuring surface area, for an example of a farmer's plot.</p> <p>Ask: What have been our experiences estimating areas?  <i>Note: Get examples for 3 to 4 participants.</i></p>	
	<p><b>Approaches to Measuring Area</b></p> <p style="text-align: center;"><b>Slide 22</b></p> <div data-bbox="647 1270 1094 1606" data-label="Image"> </div> <p>Review slide then add: Some best practices for measuring area include:</p> <ul style="list-style-type: none"> <li>• Consistency in measuring techniques</li> <li>• Calibrating instruments</li> <li>• Using standard reference datasets with known accuracy</li> <li>• Reconciling scale issues</li> <li>• Documenting methodology used</li> </ul>	

### Slide 23

**Measuring Area**

**Pacing:** Walking at a normal gait and counting the number of steps to cover the distance of a plot.

**Farmer's Estimates:** Farmer provides estimate of the surface area farmed.

**Tape and Compass:** Measuring tape and compass are used to measure plot area.

**Remote Sensing:** Use of satellite imagery to measure area.

**GPS:** Capturing geographic location data with a Global Positioning System unit (positions on the earth) to measure area.

Review the common methods for measuring area shown on the slide. As you review the methods, additional comments include:

- Pacing: waling an area and counting steps
- Farmer's Estimates: Can be accurate when combined with direct measurements and regression analysis, but may be subjective to larger error depending on the circumstances (e.g. non-standard, local measurement unit). However, new research indicates that farmer bias is significant.
- Tape and Compass: Polygon, rectangulation and triangulation methods enable straight line measurements to estimate area. CAVEATS: Requires specialized training, good math skills and enumerators must be well trained with using compasses.
- Remote Sensing: accuracy will vary depending on resolution. Not highly accurate especially for small plots. Best use is to combine with GPS for overlay reference.
- GPS: Most accurate - requires consideration of benefits of collecting georeferenced data which can be used with other data to enhance performance monitoring. Instrument and human error need to be controlled with best practices.

Say: In a few minutes we are going to go outside and try these methods!

### Slide 24

**Measuring Area**

**The Case for Collecting Geospatial Data**

- Collecting Global Positioning Systems (GPS) measurements and combining with Geographic Information Systems (GIS) data can add value to the project (deeper-dive analysis), inform follow-on, performance management, and serve as a resource for other cross-cutting projects and analysis.

GPSd plots (1,2,3) and Measurement of NDVI in grapes using USDA FSA 1-meter resolution aerial imagery. Note the bright yellow areas in the NW corner of plot #2 which indicates a low NDVI value/crop stress.

Say: With GPS surveys, you can calculate positions on the surface of the earth that can be compared to other mapped data (soils, remotely sensed crop cover/health, hydrology, slope, infrastructure etc.) Examples of deeper analyses with georeferenced data include time-distance, vulnerability, crop health and yield prediction. Check with your Mission GIS specialist (if you have one) and/or the GeoCenter to order imagery. Combining satellite imagery with ground truthed geocoded data can greatly increase accuracy. You don't need to walk through fields and potentially damage crops!

GPS: Accuracy and affordability have greatly improved ( $\pm$  3 meters, ~ \$699 USD). GPS when combined with good practices, farmer estimates, and remotely sensed imagery it can be a viable tool. does not require extensive learning curve, however, it does require calibration. NOTE: with the increased use of drones and the relatively inexpensive equipment required to capture accurate high resolution imagery, GPS data collection is greatly improving. The Global Open Data for Agriculture and Nutrition ([GODAN](#)) organization is promoting the use of “precision agriculture” which requires relevant, timely and accurate information. Real-time data collected in the field with GPS and drone technology can help farmers increase yields.

### Slide 25



**Measuring Area**  
Comparison of techniques for measuring area

	Accuracy	Cost	Equipment required	Expertise needed	Level of effort	Plot size
Eye and compass	medium-high	medium varies with quality	low	low-medium	medium-high	< .5ha
GPS	high	med high: varies with quality	high	medium	medium	> .5ha*
Pacing	low-medium	low	low	low	medium	small-medium
Farmer estimates	low-medium: high subjectivity factor	low	low	low	low	small
Remote sensing	low	high	high	high	medium	very large

Say: \*New studies show that GPS measurements, even for smaller fields (> .5 ha) can be more accurate than methods prone to high levels of bias e.g. Farmer estimates and Pacing. See [Measurement, Farm Size and Productivity \(LSMS-ISA/WorldBank\)](#)  
[http://siteresources.worldbank.org/INTSURAGRI/Resources/7420178-1294259038276/Fact\\_Artifact\\_Brief.pdf](http://siteresources.worldbank.org/INTSURAGRI/Resources/7420178-1294259038276/Fact_Artifact_Brief.pdf)

### Slide 26



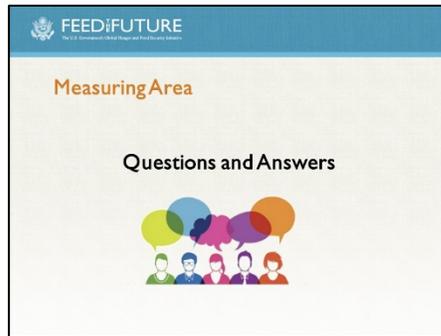
Determine if your project would benefit from investing in GPS technology.

- Is there added value for monitoring performance and measurement accuracy (e.g. NDVI analysis/crop yield)?
- Are there complementary activities planned?
- Do the costs outweigh the benefits?

Say: On last comment on methods of estimated area. If you are thinking of using GPS technology, things to consider to determine whether or not your project would benefit from investing in GPS technology include:

- Is there a local extension service that would benefit from digital and/or paper maps that can be generated from the georeferenced data (local capacity building)?
- Are there follow-on activities planned or deeper analysis like distance to markets, other services, irrigation systems, etc.?
- Are there adequate resources available to use data (technical knowledge, software etc.)? If so, include language requiring collection of GPS/geospatial data including derived data. This will ensure that partners include the cost of purchasing equipment, data collection, and processing in their proposals. Discuss issues with PII.

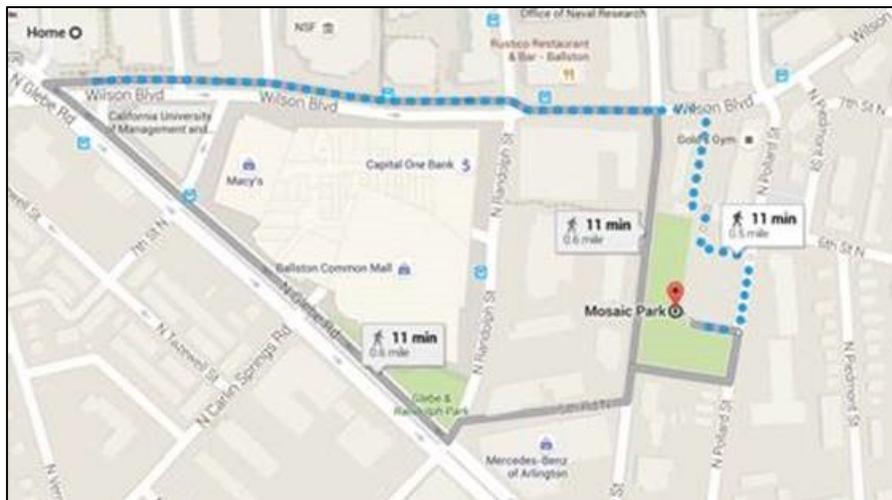
Slide 27



Ask if there are any questions.

**Field Activity in Measuring Area**

The field exercise takes approximately 2 hours. You need to find a location near the training facility in which to conduct the measuring activity. If you are conducting the session at TRG in Ballston, Arlington, VA, the suggested location is Mosaic Park, 538 North Pollard St, Arlington, VA.



**Directions:**

Note to facilitators: The handout, “Group Exercise Instructions for Estimating Area” has the complete instructions for the exercise.

- Divide the participants into three groups
  - Group 1 will delimit the plot using Pacing
  - Group 2 will use the handheld GPS
  - Group 3 will use “Farmer’s” estimate
- Handout:
  - Directions for the exercise
  - How to calculate an area in the field
  - GPS Field Protocol
  - Estimating the area of a triangle

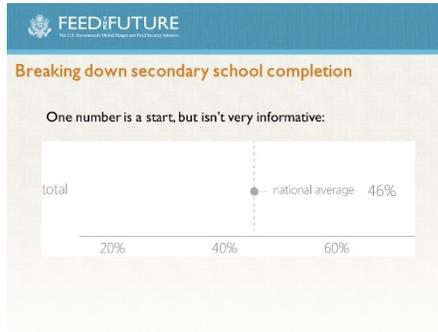
Say: The purpose of this exercise is to demonstrate how different measuring approaches result in different results. GPS should be most accurate but we will compare results to determine how much they vary and which is the most accurate.

- Handheld GPS with extra batteries
  - Marbles
  - Tape measure
  - Google earth sketch of plot to be measured
- Handouts:
- Directions for the exercise
  - Pacing
  - GPS
  - Farmer’s Estimate
  - Bottled water

3:30 pm (15 min.)	Break	
3:45 pm (60 min.)	<p><b>Disaggregating Data</b></p> <p style="text-align: center;"><b>Slide 28</b></p> <div data-bbox="647 388 1094 720" style="border: 1px solid black; padding: 10px; margin: 10px auto; width: fit-content;"> <p><b>Using Geospatial Data</b></p> <p>What if you wanted to know about lower secondary completion rates in Ghana?</p> <p>What you typically see:</p> <p>FIG 3. EDUCATIONAL ATTAINMENT, YOUTH AGES 15-24</p> <p>What else might you want to know?</p> <ul style="list-style-type: none"> <li>• Are rates different for <i>males and females</i>?</li> <li>• How do <i>urban and rural</i> populations compare?</li> <li>• <i>Where</i> is education lacking?</li> </ul> <p>FHI 360 Education Policy and Data Center</p> </div> <p>Say: What would you estimate the lower secondary school completion rate to be in Ghana? Nationally, the average is about 46% for kids between the ages of 15-24-- and often you just see these high-level numbers in something like a pie chart. While that number is a good first glance at the data, how the data vary can provide more interesting information about exactly <i>who</i> and <i>where</i> those numbers are different.</p> <p>Data are from UNICEF MICS survey, 2011   <a href="http://www.education-inequalities.org/countries/ghana/#?dimension=region&amp;group=all&amp;year=latest">http://www.education-inequalities.org/countries/ghana/#?dimension=region&amp;group=all&amp;year=latest</a></p> <p>Disaggregating data by geography and demographics is important for two reasons.</p> <p>First, geographic data provides the foundation for investigating geographic variation in performance. This allows us to ask and answer questions such as: “Does the performance of an activity vary within the implementation area?” and “Where is an activity over- or under-performing?” The same questions can be asked of different demographic groups, like between males and females, urban and rural populations, or among wealth groups</p> <p>Second, disaggregating data by geography creates a set of unique identifiers, such as administrative units or populated places that locate observations in the data. These same unique identifiers are also present in other geographically disaggregated datasets, such as performance monitoring indicators from other sectors, context indicators, and any other relevant data. By creating a common link among multiple datasets, geographically disaggregated data allows us to ask and answer additional questions, such as “Does the pattern of geographic variability in an activity’s performance relate to geographic variation observed in a contextual indicator?” and “How does the pattern of geographic variation in one activity’s performance compare to the variation in another activity’s performance?” A more practical example question comparing two performance indicators with a context indicator may be, “Is high performance in the nutrition activity and the female employment activity occurring in the same areas?” and an example question comparing a performance indicator with a contextual indicator may be, “Does the nutrition activity perform better in areas where female employment rates are higher?”</p> <p>Asking and answering these types of questions through data analysis and visualization is essential to understanding the variation in performance measures and which factors may contribute to the variation. Without geographically disaggregated performance indicators or demographically disaggregated indicators, this type of analysis cannot be applied to enhance</p>	

the learning and reflecting process and contribute to adaptive management for improved results.

### Slide 29



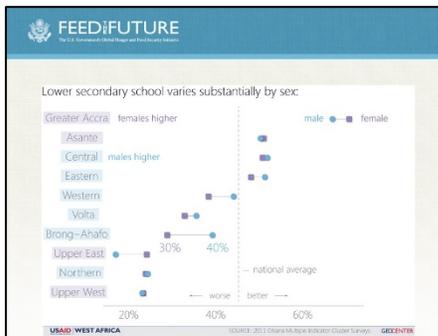
Say: Let's break down these numbers into their component parts.

### Slide 30



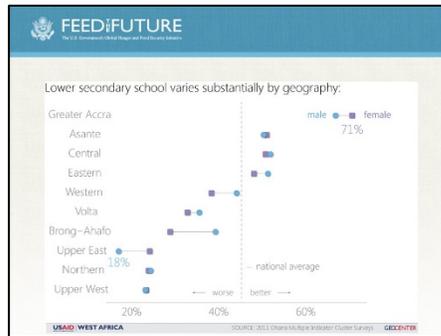
Say: When we disaggregate the data by sex, we see there's no different between males and females.

### Slide 31



Say: However, when we disaggregate the day by geography, we begin to see a difference.

### Slide 32



### Slide 33

**Common ways to disaggregate data**

- Geographically by province, district, etc.
- Sex (required by ADS 205)
- Time
- Wealth/Income/Asset index
- Urban/Rural
- Age
- Education

Say: The most common ways that FTF data are disaggregated are by:

- Geographically by province, district, etc.
- Sex (required by ADS 205)
- Time
- Wealth/income/asset index
- Urban/rural
- Age
- Education

### Slide 34

**If someone asked you where your Activity/IM is located, at which scale would you give the information?**

Scale #	Scale	Admin 1	Admin 2	Populated Place	Latitude	Longitude	Altitude/Distance
1	San Martín						Microfinance
2	San Martín	Lamas					Microfinance
3	San Martín	Lamas	Tarapoto				Microfinance
4	San Martín	Lamas	Tarapoto	-6, 1545	-4, 892		Microfinance

Animated slide.

Say: let's look at how data can be disaggregated geographically.

- It is common for countries to be divided up into 3 or more levels of administrative units that are referred to 1<sup>st</sup> Administrative Units (Province, Region, Department, etc.), 2<sup>nd</sup> Administrative Units (District, etc.) and so on and serve that serve as geographic boundaries that divide the country.

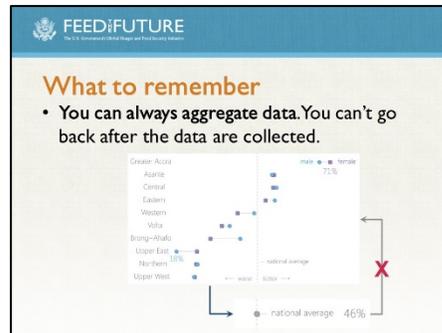
Flipchart

- Administrative units are commonly used as enumeration areas for statistical data that describes the population within the administrative unit such as health indicators, employment indicators, etc., and sometimes data is collected at the point location scale using latitude and longitude coordinates. The geographic scale of that data depends on at which administrative unit level the data was collected or if it was collected at the point location scale.
- In this presentation, we'll be using Peru as an example but the same concept applies for other countries.

There are different geographic scales:

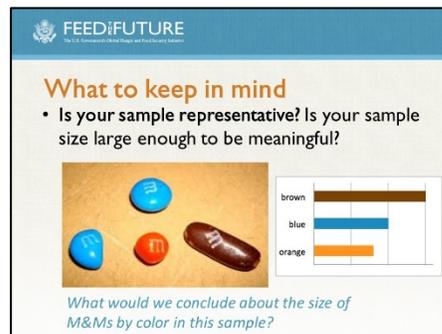
- The Region or Admin 1 scale is shown on the left.
  - Data collected with location information at the Region/Admin 1 scale can only be displayed at this scale. We can't disaggregate data at this scale to be shown at the District/Admin 2 or Point Location/Lat./Long. scale because we don't have information at those scales.
- District or Admin 2 scale is shown in the middle.
  - Data collected with location information at the District/Admin 2 scale can be displayed at this scale and aggregated to be displayed at the Region/Admin 1 scale, we can't disaggregate data at this scale to be shown at the Point Location/Lat./Long. scale because we don't have that information.
- Point Location scale data is shown on the right.
  - Data collected with location information at the Point location scale can be displayed at this scale and aggregated to be displayed at the District/Admin 2 scale or Region/Admin 1 scale because we have that information.

### Slide 35



Read slide.

### Slide 36



Say: And also keep in mind that you need a representative sample. Ask yourself: Is my sample size large enough to be meaningful? Then eat the M&Ms!

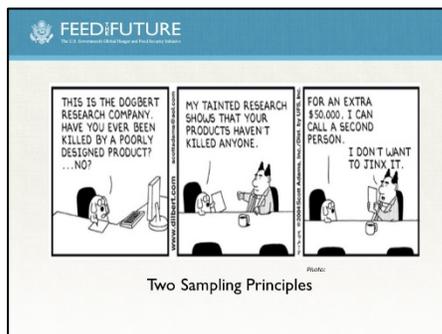
### Transition to Sampling Basics

#### Slide 37



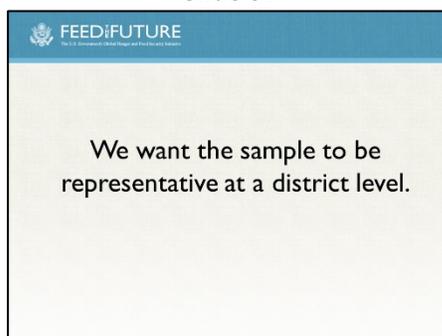
Say: In the last slide, I mentioned that you need to think about your sample size. Let's continue exploring sampling.

#### Slide 38



Say: This is going to be a quick session. We're not going to go into detail on sample design nor sources of sampling and non-sampling error. There are good references available that provide guidance of sampling design, including the recently released Feed the Future Annual Beneficiary-Based Survey Sampling Guide and accompanying sample calculator. I just want to cover two basic principles that are often confused when people talk about the desired characteristics of a survey they are commissioning, designing or analyzing.

#### Slide 39



Say: I'm sure you have heard the following statement or something similar. "We want the sample to be representative at a district level."

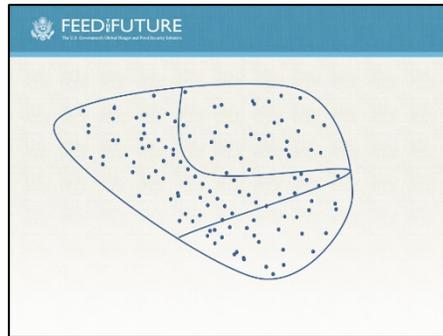
Ask: What do you think the person saying this means? What do you think they want to be able to do with the data in terms of indicator estimates?

Write participation responses on a flipchart.

Say: Now, here's part of the guidance for the interim population-based surveys. "The interim is designed to provide indicator estimates with an acceptable level of statistical precision."

Let's see what that means.

**Slide 40**

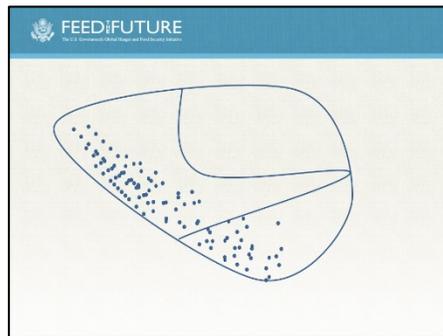


Say: This is our three district ZOI. Each dot represents one household sampled in a survey.

Ask: Do you think this a representative sample of the ZOI?

Answer: Yes, it is a representative sample because the households selected are randomly distributed across the ZOI.

**Slide 41**



Say: Here's the same sample of households.

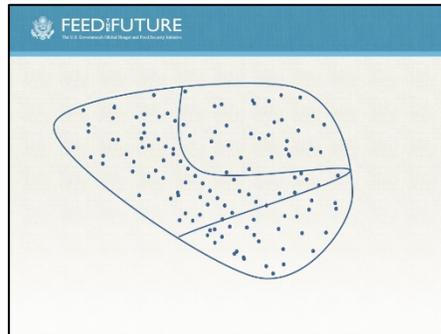
Ask: Do you think this is a representative sample of the ZOI?

Answer: N, of course it isn't It's a biased sample that perhaps will be representative of the south-western portion of the ZOI, but not of the whole ZOI. The opposite of representative is biased.

Say: Let's go back to what you thought the person wanted when they said they wanted a representative sample. You are right that what people usually mean when they say this is that

they want to be able to calculate indicator estimates at the district level in addition to the ZOI.

### Slide 42



Say: Our guidance for the interim population-based survey in the ZOI was that the sample size should be large enough for poverty, stunting and other key indicators to be calculated with a 10% margin of error. The 10% margin of error is the measure of how precise we wanted the indicator estimates to be. Let's say this represents the sample size required to calculate the key indicators at the ZOI level with no more than 10% margin of error. Say 1,000 households. Look at how much of the sample falls in each of the three districts.

Ask: Do you think that the estimates for each of the three districts could be calculated with the same margin of error or precision as the overall ZOI estimate? Yes or no?

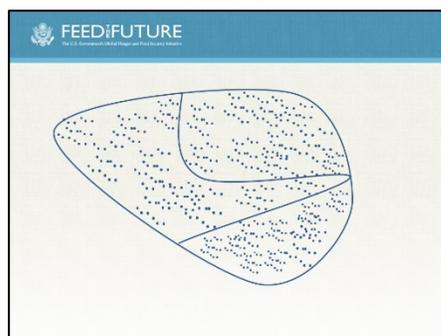
Pick a participant who says no and ask them why not?

Say: Correct, because the sample size in each district is smaller than the sample size required for a 10% margin of error estimate. That means that the margin of error will be more than 10% at the district level.

Ask: So what would be required in terms of sample to have district-level estimates with the sample level of precision?

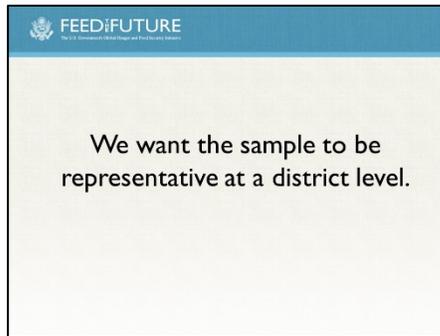
Answer: see next slide

### Slide 43



Say: Correct. The sample size for the ZOI survey would be three-times as large or 3,000 households, 1,000 per district in order to have district-level estimates at the 10% level of precision. Often, when people find out that they need to multiply the sample size by the number of districts for which they want estimates, they decide to forget about district-level estimates or accept a lower level of precision at the district-level.

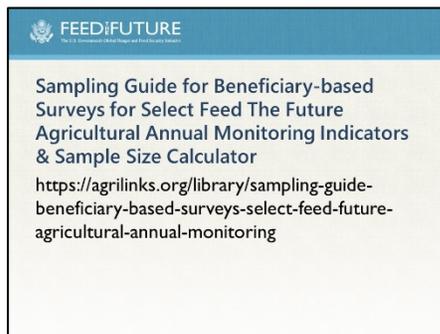
#### Slide 44



Ask: So let's go back to our original statement. How might we reword it to say what we really mean it to say? Write participation responses on a flipchart.

Say: We want the sample size to be large enough to give us district-level estimates at a 10% level of precision.

#### Slide 45



Say: Finally, here is you can find the sampling guide and calculator I referenced at the beginning of the session.

4:45pm  
(30 min.)

**Optional (but encouraged)  
Individual Application**

**Slide 46**

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### Individual Application

Think about a FTF activity in which you will need to collect performance monitoring data

- Select one variable on which you will collect data
- Do you need to disaggregate the data?
- If so, how will you disaggregate the data
- Sample size

**Individual Activity**

- Refer participants to their participant guide and the individual application in which they created a Gantt Chart for one of their FTF activities
- Give the following directions:
  - Think about an FTF activity in which you need to collect performance monitoring data.
    - Select one variable on which you will collect data
    - Do you need to disaggregate the data
    - If so, how will you disaggregate the data
    - Sample size

**Pair Activity**

- Each partner shares their individual plans for collecting the data
- Partners ask questions/provide feedback

**Plenary Debrief**

- Ask for two or three examples of variables people selected and how they planned to collect the data (e.g., disaggregate, sample size, etc.)

**Slide 47**

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### Lessons learned about:

- Planning the entire process of collecting data
- Diagramming indicators
- Developing questionnaires
- Measuring area
- Sampling

**Ask different participants to highlight lessons learned about:**

- Planning the data collection process
- Diagramming indicators
- Developing questionnaires
- Measuring area
- Sampling

## Resources

### Slide 48



**FEEDiFUTURE**  
The U.S. Department of Agriculture and Feed the Future Mission

**Resources for Estimated Area**

- Feed the Future Agricultural Indicators Handbook:  
[https://agrilinks.org/sites/default/files/resource/files/FTF\\_Agriculture\\_Indicators\\_Guide\\_Mar\\_2015.pdf](https://agrilinks.org/sites/default/files/resource/files/FTF_Agriculture_Indicators_Guide_Mar_2015.pdf)
- USGS Global Positioning Application and Practice:  
<http://water.usgs.gov/osw/gps/>
- GNSS in Africa : [http://www.gnss-africa.org/?page\\_id=23](http://www.gnss-africa.org/?page_id=23)
- Measurement, Farm Size and Productivity (LSMS-ISA/WorldBank)  
[http://siteresources.worldbank.org/INTSURAGRI/Resources/74201781294259038276/Fact\\_Artifact\\_Brief.pdf](http://siteresources.worldbank.org/INTSURAGRI/Resources/74201781294259038276/Fact_Artifact_Brief.pdf)
- The Humanitarian Data Exchange - Open Data Sources for the Global Development Community: <https://data.humdata.org/>
- Army Study Guide (How to Pace Count):  
[http://www.armystudyguide.com/content/army\\_board\\_study\\_guide\\_topics/land\\_navigation\\_map\\_reading/how-to-use-pace-count-to-shtml](http://www.armystudyguide.com/content/army_board_study_guide_topics/land_navigation_map_reading/how-to-use-pace-count-to-shtml)

**SPS LOCATION: Program Sub-element EG.3.3: Nutrition-Sensitive Agriculture**  
**INITIATIVE AFFILIATION: Feed the Future – IR 6: Improved access to diverse and quality foods**

**INDICATOR TITLE: EG.3.3-10 Percentage of female direct beneficiaries of USG nutrition-sensitive agriculture activities consuming a diet of minimum diversity**

**DEFINITION:**

A female direct beneficiary of a nutrition-sensitive agriculture activity is defined as a female of any age who is directly reached by the activity with agriculture-related intervention(s) (e.g. training, technical assistance, input access). Her interaction with the activity should be significant, meaning that a woman reached by an agriculture activity solely through brief attendance at a meeting or gathering should not be counted as beneficiary.

This indicator is applicable to nutrition-sensitive agriculture activities with explicit consumption, diet quality, or other nutrition-related objectives and/or outcomes. These nutrition-sensitive agriculture activities should be implementing components addressing one or more of the three agriculture-to-nutrition pathways: Food Production, Agricultural income, and Women's Empowerment.<sup>1</sup>

A female is considered to be consuming a diet of minimum diversity if she consumed at least five of 10 specific food groups during the previous day and night.<sup>2</sup>

The 10 food groups are:

1. Grains, white roots and tubers, and plantains
2. Pulses (beans, peas and lentils)
3. Nuts and seeds<sup>3</sup> (including groundnut)
4. Dairy
5. Meat, poultry, and fish
6. Eggs
7. Dark green leafy vegetables
8. Other vitamin A-rich fruits and vegetables
9. Other vegetables
10. Other fruits

The numerator for this indicator is the total number of female direct beneficiaries of the nutrition-sensitive agriculture activity who consumed 5 out of 10 food groups during the previous day and night.

The denominator is the total number of female direct beneficiaries of the nutrition-sensitive agriculture activity.

If data for this indicator are collected through a beneficiary-based sample survey, the numerator is the sample-weighted extrapolated total number of female direct beneficiaries of the nutrition-sensitive agriculture activity who consumed 5 out of 10 food groups during the previous day and night. The denominator is the sample-weighted extrapolated total number of female direct beneficiaries of the nutrition-sensitive agriculture activity with food group data.

Data should be collected annually at the same time of year since the indicator will likely display considerable seasonal variability. If possible, data should be collected at the time of year when diversity is likely to be the lowest to best capture improvements in year-round

<sup>1</sup> See Improving Nutrition through Agriculture Technical Brief Series, <https://www.spring-nutrition.org/publications/series/improving-nutrition-through-agriculture-technical-brief-series>

<sup>2</sup> See Introducing the Minimum Dietary Diversity – Women (MDD-W) Global Dietary Diversity Indicator for Women, [http://www.fao.org/fileadmin/templates/nutrition\\_assessment/Dietary\\_Diversity/Minimum\\_dietary\\_diversity\\_-\\_women\\_MDD-W\\_Sept\\_2014.pdf](http://www.fao.org/fileadmin/templates/nutrition_assessment/Dietary_Diversity/Minimum_dietary_diversity_-_women_MDD-W_Sept_2014.pdf). Additional detail on collecting and analyzing minimum dietary diversity indicator may be found in Minimum Dietary Diversity for Women – A Guide to Measurement (<http://www.fao.org/3/a-i5486e.pdf>)

<sup>3</sup> "Seeds" in the botanical sense includes a very broad range of items, including grains and pulses. However, "seeds" is used here in a culinary sense to refer to a limited number of seeds, excluding grains or pulses, that are typically high in fat content and are consumed as a substantial ingredient in local dishes or eaten as a substantial snack or side dish. Examples include squash, melon or gourd seeds used as a main ingredient in West African stews and sesame seed paste (tahini) in some dishes in Middle Eastern cuisines.

consumption of a diverse diet. However, Feed the Future recognizes that data for this indicator is likely to be collected in the post-harvest/sale period when data for other Required if Applicable (RIA) indicators, such as gross margins and incremental sales, are collected. In this case, the indicator value may reflect a best-case scenario in terms of yearly access to a quality and diverse diet by female beneficiaries.

**Notes:**

1. This indicator complements the Feed the Future indicator "Prevalence of women of reproductive age consuming a diet of minimum diversity," which measures minimum dietary diversity among women 15-49 years old in the Feed the Future Zone of Influence through a population-based survey.
2. Using the data collected for this indicator, activities may wish to create a custom indicator measuring the average number of food groups consumed by female beneficiaries. This will allow managers to better understand progress made under this indicator, and would be especially useful in situations where diet diversity is very low at baseline.

**RATIONALE:**  
 This indicator will capture results under the Increased Availability of and Access to High-quality Nutrition-Sensitive Services and Commodities Sub-IR under USAID's Multisectoral Nutrition Strategy Results Framework, and the Improved Access to Diverse and Quality Foods IR of the Feed the Future Results Framework. Minimum Dietary Diversity – Women (MDD-W) is a validated proxy indicator for the quality of the diet for women of reproductive age (15-49 years). Women of reproductive age consuming foods from five or more of the 10 food groups are more likely to consume a diet higher in micronutrient adequacy than women consuming foods from fewer than five of these food groups [3]. While it is possible that some female direct beneficiaries measured under this indicator will be younger than 15 years or 50 years or older, we assume the majority will be women of reproductive age. Thus the indicator would still be a validated proxy for the likelihood of micronutrient adequacy for the majority of beneficiaries captured, while still capturing the consumption of a diverse diet for the remainder.

<b>UNIT:</b> Percent	<b>DISAGGREGATE BY:</b> In addition to reporting the percent value, the number of female direct beneficiaries of the nutrition-sensitive agriculture activity should be reported, to allow a weighted average percent to be calculated across activities for entry into the PPR and across operating units for reporting on the Nutrition Strategy.
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<b>TYPE:</b> Outcome	<b>DIRECTION OF CHANGE:</b> Higher is better
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**DATA SOURCE:**  
 Data for this indicator can be collected through routine reporting systems or annual (or more frequent) beneficiary-based surveys.

- MEASUREMENT NOTES:**
- LEVEL OF COLLECTION: Activity-level, direct beneficiaries
  - WHO COLLECTS DATA FOR THIS INDICATOR: Implementing partners
  - HOW SHOULD IT BE COLLECTED: Direct beneficiary sample surveys; data collection through routine reporting systems
  - FREQUENCY OF COLLECTION: Annually

<b>TYPE:</b> Outcome	<b>DIRECTION OF CHANGE:</b> Higher is better
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**DATA SOURCE:**  
 Implementing Partners will collect this data through census or survey of direct beneficiaries, direct observations of land, farm records, and activity documents.

- MEASUREMENT NOTES:**
- LEVEL OF COLLECTION: Activity-level, direct beneficiaries; only those hectares affected by USG assistance, and only those newly brought or continuing under improved technologies/management during the current reporting year
  - WHO COLLECTS DATA FOR THIS INDICATOR: Implementing partners
  - HOW SHOULD IT BE COLLECTED: Via survey or other applicable method
  - FREQUENCY OF COLLECTION: Annually reported

SPS LOCATION: Program Element EG.3.2: Agricultural Sector Capacity

INITIATIVE AFFILIATION: Feed the Future – IR 1: Improved Agricultural Productivity / Sub IR 1.2: Enhanced Technology Development, Dissemination, Management and Innovation

INDICATOR TITLE: EG.3.2-18 Number of hectares under improved technologies or management practices with USG assistance

*DEFINITION:*

This indicator measures the area (in hectares) of land cultivated using USG-promoted improved technology(ies) or management practice(s) during the reporting year. Technologies to be counted are agriculture-related, land-based technologies and innovations, including those that address climate change adaptation and mitigation. The indicator does not count application of improved technologies in aquaculture ponds, even though area of ponds is measured in hectares under indicator EG.3-6 Gross Margin per hectare. Significant improvements to existing technologies should also be counted.

Examples of relevant technologies include:

- **Crop genetics:** e.g. improved/certified seed that could be higher-yielding, higher in nutritional content (e.g. through biofortification, such as vitamin A-rich sweet potatoes or rice, or high-protein maize), and/or more resilient to climate impacts; improved germplasm.
- **Cultural practices:** e.g. seedling production and transplantation; cultivation practices such as planting density, moulding; mulching.
- **Pest management:** e.g. Integrated Pest Management; appropriate application of insecticides and pesticides.
- **Disease management:** e.g. improved fungicides, appropriate application of fungicides.
- **Soil-related fertility and conservation:** e.g. Integrated Soil Fertility Management; soil management practices that increase biotic activity and soil organic matter levels, such as soil amendments to increase fertilizer-use efficiency (e.g. mulching); fertilizers; erosion control.
- **Irrigation:** e.g. drip, surface, sprinkler irrigation; irrigation schemes.
- **Water management - non-irrigation-based:** e.g. water harvesting; mulching.
- **Climate Mitigation:** technologies selected because they minimize emission intensities relative to other alternatives. Examples include low- or no-till practices, efficient nitrogen fertilizer use.
- **Climate Adaptation:** technologies promoted with the explicit objective of adapting to current climate change concerns. Examples include drought and flood resistant varieties, conservation agriculture.
- **Other:** e.g. improved mechanical and physical land preparation.

If an activity is promoting a technology for multiple benefits, the area under the technology may be reported under each relevant category under the Technology Type disaggregate. For example, mulching could be reported under Cultural practices (weed control), Soil-related fertility and conservation (organic content) and Water management (moisture control), depending on how of for what purpose(s) or benefit(s) the activity was promoted.

If a beneficiary **cultivates a plot of land more than once in the reporting year**, the area should be counted each time one or more improved technologies is applied. For example, because of access to irrigation as a result of a Feed the Future activity, a farmer can now cultivate a

second crop during the dry season in addition to her/his regular crop during the rainy season. If the farmer applies Feed the Future promoted technologies to her/his plot during both the rainy season and the dry season, the area of the plot would be counted twice under this indicator. However, the farmer would only be counted once under *EG.3.2-17 Number of farmers and others who have applied improved technologies*.

If a **group of beneficiaries cultivate a plot of land as a group**, e.g. an association has a common plot on which multiple association members cultivate together, and on which improved technologies are applied, the area of the communal plot should be counted under this indicator and recorded under the sex disaggregate "association-applied". In addition, the association should be counted once under indicator *EG.3.2-20 Number of for-profit private enterprises, producer's organizations... and community-based organizations (CBOs) that applied improved organization-level technologies or management practices*.

If a **lead farmer cultivates a plot used for training**, e.g. a demonstration plot used for Farmer Field Days or Farmer Field School, the area of the demonstration plot should be counted under this indicator. In addition, the lead farmer should be counted as one individual under indicator *EG.3.2-17 Number of farmers and others who have applied improved technologies*. However, if the demonstration or training plot is cultivated by extension agents or researchers, (a demonstration plot in a research institute, for instance) neither the area nor the extension agent or researcher should be counted under this indicator or indicator *EG.3.2-17*.

If **more than one improved technology is being applied on a hectare**, count the hectare under each technology type (i.e. double-count). In addition, count the hectare under the Total w/one or more improved technology category. Since it is very common for Feed the Future activities to promote more than one improved technology, not all of which are applied by all beneficiaries at once, this approach allows Feed the Future to accurately track and count the uptake of different technology types, and to accurately count the total number of hectares under improved technologies.

If a direct beneficiary sample survey is used to collect data for this indicator, the sample weighted estimate of the total number of hectares across all beneficiaries for each Technology Type and Sex disaggregate must be calculated using appropriate sample weights before being entered into FTFMS to ensure accurate calculation of weighted averages across all implementing mechanisms at the Operating Unit level as well as across all Feed the Future countries for global reporting.

Please refer to the [Feed the Future Agricultural Indicators Guide \(https://agrilinks.org/library/feed-the-future-ag-indicators-guide\)](https://agrilinks.org/library/feed-the-future-ag-indicators-guide) for collecting and interpreting the data required for this indicator.

**RATIONALE:**

This indicator tracks successful application of technologies and management practices in an effort to improve agricultural productivity, agricultural water productivity, sustainability, and resilience to climate change. In the Feed the Future (FTF) results framework, this indicator reports contributions to IR 1: Improved Agricultural Productivity and Sub IR 1.2: Enhanced Technology Development, Dissemination, Management and Innovation.

**UNIT:**

Hectares

**DISAGGREGATE BY:**

Technology type (see explanation in definition, above): Crop genetics, Cultural practices, Pest management, Disease management, Soil-related fertility and conservation, Irrigation, Water management, Climate mitigation, Climate adaptation, Other; Total w/one or more improved technology

	<p><u>Sex</u>: Male, Female, Joint, Association-applied</p> <p><i>Note, before using the "Joint" sex disaggregate category, partners must determine that decision-making about what to plant on the plot of land and how to manage it for that particular beneficiary and targeted commodity is truly done in a joint manner by male(s) and female(s) within the household. Given what we know about gender dynamics in agriculture, "joint" should <u>not</u> be the default assumption about how decisions about the management of the plot are made.</i></p> <p><i>Note: The sum of hectares under the Sex disaggregate should equal the total under the "Total w/one or more improved technology" Technology Type disaggregate.</i></p> <p><u>FTFMS-only disaggregate: Commodity</u></p> <p>Activities promoting sustainable intensification and similar crop diversification strategies where calculating area under specific commodities is complicated and not meaningful are not required to disaggregate beneficiaries by commodity, and should use the "Disaggregates not available" category under the Commodities disaggregate.</p>
<p>TYPE:</p> <p>Outcome</p>	<p><i>DIRECTION OF CHANGE:</i></p> <p>Higher is better</p>
<p><i>DATA SOURCE:</i></p> <p>Implementing Partners will collect this data through census or survey of direct beneficiaries, direct observations of land, farm records, and activity documents.</p>	
<p><i>MEASUREMENT NOTES:</i></p> <ul style="list-style-type: none"> <li>➤ LEVEL OF COLLECTION: Activity-level, direct beneficiaries; only those hectares affected by USG assistance, and only those newly brought or continuing under improved technologies/management during the current reporting year</li> <li>➤ WHO COLLECTS DATA FOR THIS INDICATOR: Implementing partners</li> <li>➤ HOW SHOULD IT BE COLLECTED: Via survey or other applicable method</li> <li>➤ FREQUENCY OF COLLECTION: Annually reported</li> </ul>	

## Steps in the QAS

- **STEP 1: READING:** Determine if it is difficult for the interviewers to read the question uniformly to all respondents.
- **STEP 2: INSTRUCTIONS:** Look for problems with any introductions, instructions, or explanations from the respondent's point of view.
- **STEP 3: CLARITY:** Identify problems related to communicating the intent or meaning of the question to the respondent.
- **STEP 4: ASSUMPTIONS:** Determine if there are problems with assumptions made or the underlying logic.
- **STEP 5: KNOWLEDGE/MEMORY:** Check whether respondents are likely to not know or have trouble remembering information.
- **STEP 6: SENSITIVITY/BIAS:** Assess questions for sensitive nature or wording, and for bias.
- **STEP 7: RESPONSE CATEGORIES:** Assess the adequacy of the range of responses to be recorded.
- **STEP 8: OTHER:** Look for problems not identified in Steps 1 - 7.

AREDONIA BASELINE SURVEY - HOUSEHOLD QUESTIONNAIRE				
IDENTIFICATION				
A. DEPARTMENT (CIRCLE ONE)    1 ARTIBONITE    2 OUEST    3 NORD    4 NORD-EST				
B. COMMUNE _____				
C. SECTION COMMUNALE _____				
D. NAME OF SELECTED RESPONDENT _____				
E. CLUSTER NUMBER .....	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
F. STRUCTURE NUMBER .....	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
G. HOUSEHOLD NUMBER	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
INTERVIEWER VISITS				
	1	2	3	FINAL VISIT
G. DATE	<input type="text"/>	<input type="text"/>	<input type="text"/>	K. DAY <input type="text"/> L. MONTH <input type="text"/> M. YEAR <input type="text" value="2"/> <input type="text" value="0"/> <input type="text" value="1"/> <input type="text" value="6"/>
H. INTERVIEWER'S NAME	<input type="text"/>	<input type="text"/>	<input type="text"/>	N. INT NUMBER <input type="text"/> O. RESULT CODE* <input type="text"/>
J. RESULT CODE*	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
NEXT VISIT: DATE	<input type="text"/>	<input type="text"/>	<input type="text"/>	
TIME	<input type="text"/>	<input type="text"/>	<input type="text"/>	
*RESULT CODES: 01 COMPLETED 02 NO HOUSEHOLD MEMBER AT HOME 03 RESPONDENT NOT AT HOME AT TIME OF VISIT 04 NO APPROPRIATE RESPONDENT 05 ENTIRE HOUSEHOLD ABSENT FOR EXTENDED PERIOD OF TIME 06 POSTPONED 07 STRUCTURE NOT FOUND 08 STRUCTURE DESTROYED 09 STRUCTURE NOT ADWELLING 10 STRUCTURE VACANT 96 OTHER _____ (SPECIFY) 97 REFUSED				P. TOTAL NUMBER OF VISITS <input type="text"/> Q. TOTAL PERSONS IN HOUSEHOLD <input type="text"/> R. PRIMARY ADULT DECISIONMAKER (1=YES, 2=NO) <input type="text"/> MALE <input type="text"/> FEMALE U. LINE NO. OF RESPONDENT TO HOUSEHOLD QUESTIONNAIRE <input type="text"/>
V. SUPERVISOR NAME <input type="text"/>	W. FIELD EDITOR NAME <input type="text"/>		X. OFFICE EDITOR <input type="text"/>	Y. KEYED BY <input type="text"/>
INTRODUCTION AND CONSENT				
<p>Hello. My name is _____. I am working with the National Aredonia Statistical Office. We are conducting a survey about health, education, nutrition &amp; agriculture, employment, and community services in many places in Aredonia. The information we collect will help the government to plan health, employment, and community services. Your household was selected for the survey. I would like to ask you some questions about your household. Today's visit may take up to two hours. All of the answers you give will be confidential and will not be shared with anyone other than members of our survey team. You don't have to be in the survey, but we hope you will agree to answer the questions since your views are important. If I ask you any question you don't want to answer, just let me know and I will go on to the next question or you can stop the interview at any time. In case you need more information about the survey, you may contact the person listed on this card.</p> <p>GIVE CARD WITH CONTACT INFORMATION</p> <p>Do you have any questions?</p> <p>Z. May I begin the interview now?</p> <p>SIGNATURE OF INTERVIEWER: _____ DATE: _____</p> <p>RESPONDENT AGREES TO BE INTERVIEWED ... 1      RESPONDENT DOES NOT AGREE TO BE INTERVIEWED ... 2 → THANK THE RESPONDENT AND END THE INTERVIEW</p>				
AA. START TIME    H    H    :    M    M    CIRCLE ONE <input type="text"/> <input type="text"/> : <input type="text"/> <input type="text"/> AM    PM				

SECTION 1. HOUSEHOLD ROSTER																											
00a. Who would you say is the primary adult male decisionmaker in this household? This person should be 18 years old or older.																											
PRIMARY ADULT MALE DECISIONMAKER EXISTS IN HOUSEHOLD ..... 1 → ENTER NAME OF PRIMARY ADULT MALE DECISIONMAKER ON LINE 01 OF THE ROSTER. OS 3 & 4 ARE PRE-FILLED FOR THIS LINE NUMBER.																											
NO PRIMARY ADULT MALE DECISIONMAKER IN HOUSEHOLD ..... 2																											
00b. Who would you say is the primary adult female decisionmaker in this household? This person should be 18 years old or older.																											
PRIMARY ADULT FEMALE DECISIONMAKER EXISTS IN HOUSEHOLD ..... 1 → ENTER NAME OF PRIMARY ADULT FEMALE DECISIONMAKER ON LINE 02 OF THE ROSTER. O3 IS PRE-FILLED FOR THIS LINE NUMBER.																											
NO PRIMARY ADULT FEMALE DECISIONMAKER IN HOUSEHOLD ..... 2																											
LINE NO.	USUAL RESIDENTS	JOB	RELATION TO PRIMARY DECISIONMAKER	RESIDENCE		AGE	ELIGIBILITY	IF AGE 15 YEARS OR OLDER		IF AGE 3 YEARS OR OLDER		IF AGE 3-24 YEARS															
				5	6			7	8	9	10	11	12	13	14	15											
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15													
	Now, please tell me the names of all of the other people who usually live here, and guests of the household who stayed here last night.  LIST ALL HOUSEHOLD MEMBER NAMES (COL 2), SEX (COL 3), AND RELATIONSHIP (COL 4) TO THE PRIMARY DECISIONMAKER NAMED IN LINE 01, OR NAMED IN LINE 02 IF NO HH MEMBER ON LINE 01.	Is [NAME] a farmer?	What is [NAME]'s relationship to the primary male decisionmaker? IF NO PRIMARY MALE DECISION-MAKER: What is [NAME]'s relationship to the primary female decisionmaker? SEE CODES BELOW	Does [NAME] usually live here?	Did [NAME] stay here last night?	How old is [NAME]? IF 95 OR OLDER, RECORD 95	CIRCLE LINE NUMBER OF SELECTED RESPONDENT	What is [NAME]'s current marital status? MARRIED OR LIVING TOGETHER ..... 1 DIVORCED OR SEPARATED ... 2 VIVAVEK ..... 3 WIDOWED ..... 4 NEVER MARRIED & NEVER LIVED TOGETHER ... 5	What is the highest level of school [NAME] has attended? SEE CODES BELOW	Has [NAME] ever attended school?	What is the highest grade [NAME] completed at that level? SEE CODES BELOW	Did [NAME] attend school at any time during the current 2015-2016 school year? SEE CODES BELOW	In the current 2015-2016 school year, what level and grade of school does [NAME] attend? SEE CODES BELOW	In the current 2015-2016 school year, what type of school does [NAME] attend? PUBLIC, NON-RELIGIOUS.....1 PUBLIC RELIGIOUS.....2 PRIVATE, RELIGIOUS.....3 PRIVATE, NON-RELIGIOUS.....4 FOREIGN.....5	In the current 2015-2016 school year, how often are teachers present in [NAME]'s classroom? ALWAYS... 1 OFTEN... 2 RARELY... 3 DON'T KNOW..... 4												
01	S	Y N 1 2	0 1	Y N 1 2	Y N 1 2	IN YEARS	01	<input type="checkbox"/>	Y N 1 2 NEXT LINE	LEVEL GRADE	Y N 1 2 NEXT LINE	LEVEL GRADE	<input type="checkbox"/>	<input type="checkbox"/>													
02		Y N 1 2	<input type="text"/>	Y N 1 2	Y N 1 2	IN YEARS	02	<input type="checkbox"/>	Y N 1 2 NEXT LINE	LEVEL GRADE	Y N 1 2 NEXT LINE	LEVEL GRADE	<input type="checkbox"/>	<input type="checkbox"/>													
03		Y N 1 2	<input type="text"/>	Y N 1 2	Y N 1 2	IN YEARS	03	<input type="checkbox"/>	Y N 1 2 NEXT LINE	LEVEL GRADE	Y N 1 2 NEXT LINE	LEVEL GRADE	<input type="checkbox"/>	<input type="checkbox"/>													
04		Y N 1 2	<input type="text"/>	Y N 1 2	Y N 1 2	IN YEARS	04	<input type="checkbox"/>	Y N 1 2 NEXT LINE	LEVEL GRADE	Y N 1 2 NEXT LINE	LEVEL GRADE	<input type="checkbox"/>	<input type="checkbox"/>													
2A) Just to make sure that I have a complete listing: are there any other persons such as small children or infants that we have not listed? Any children in school or household members at work that we haven't yet listed?				YES → NO	ADD TO TABLE	CODES FOR Q4: RELATIONSHIP TO PRIMARY DECISIONMAKER				CODES FOR Qs 11 and 13:																	
2B) Are there any other people who may not be members of your family, such as domestic servants, lodgers, or friends, who usually live here?				YES → NO	ADD TO TABLE	SELF ..... 01	WIFE OR HUSBAND ..... 02	SON OR DAUGHTER ..... 03	SON-IN-LAW OR DAUGHTER-IN-LAW ..... 04	GRANDCHILD ..... 05	MOTHER/FATHER ..... 06	MOTHER/FATHER-IN-LAW ..... 07	BROTHER OR SISTER ..... 08	COUSIN ..... 09	NIECE/NEPHEW ..... 10	UNCLE/AUNT ..... 11	ADOPTED ..... 12	CHILD IN GUARDIANSHIP ..... 13	OTHER RELATION ..... 14	FRIEND ..... 15	WORKER ..... 16	BROTHER OR SISTER ..... 17	RESTAVEK ..... 17	NO DECISIONMAKER AGE 18+ ..... 18	OTHER ..... 96	LEVEL: PRESCHOOL ..... 1 PRIMARY ..... 2 SECONDARY ..... 3 COLLEGE/UNIVERSITY ..... 4	GRADE: LESS THAN 1 YEAR ..... 0 1ST YEAR ..... 1 2ND YEAR ..... 2 3RD YEAR ..... 3 4TH YEAR ..... 4 DON'T KNOW ..... 8
2C) Are there any guests or temporary visitors staying here, or anyone else who stayed here last night, who have not been listed?				YES → NO	ADD TO TABLE																						

SECTION 5.1 HUNGER

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
501	In the past 4 weeks, was there ever no food to eat of any kind in your house because of lack of resources to get	YES ..... 1 NO ..... 2	→ 503
502	How often did this happen in the past 4 weeks?	RARELY (1-2 TIMES) ..... 1 SOMETIMES (3-10 TIMES) ..... 2 OFTEN (MORE THAN 10 TIMES) ..... 3	
503	In the past 4 weeks, did you or any household member go to sleep at night hungry because there was not enough food?	YES ..... 1 NO ..... 2	→ 505
504	How often did this happen in the past 4 weeks?	RARELY (1-2 TIMES) ..... 1 SOMETIMES (3-10 TIMES) ..... 2 OFTEN (MORE THAN 10 TIMES) ..... 3	
505	In the past 4 weeks, did you or any household member go a whole day and night without eating anything at all because there was not enough food?	YES ..... 1 NO ..... 2	→ 507
506	How often did this happen in the past 4 weeks?	RARELY (1-2 TIMES) ..... 1 SOMETIMES (3-10 TIMES) ..... 2 OFTEN (MORE THAN 10 TIMES) ..... 3	

MODULES D, E, F, FF: AGRICULTURAL PRODUCTION – CROP LIST

D00. Did anyone in the household cultivate any crops between February 2015 and February 2016? Which crops? [SELECT ALL THAT APPLY]		
CROP LIST A Modules D, E, and F	CROP LIST B Modules FF	CROP LIST C no module
<p><i>Cereals</i></p> <p>01. Corn YES...1 NO...2</p> <p>02. Rice YES...1 NO...2</p> <p>03. Sorghum/Millet YES...1 NO...2</p> <p><i>Leguminous Crops</i></p> <p>04. Lima beans YES...1 NO...2</p> <p>05. Pigeon peas YES...1 NO...2</p> <p>06. Lentils YES...1 NO...2</p> <p><i>Vegetables</i></p> <p>07. Cabbage YES...1 NO...2</p> <p>08. Lettuce YES...1 NO...2</p> <p>09. Spinach, purslane YES...1 NO...2</p> <p>10. Tomato YES...1 NO...2</p> <p>11. Bell pepper YES...1 NO...2</p> <p>12. Leek, shallots YES...1 NO...2</p> <p><i>Roots and Tubers</i></p> <p>13. Potato YES...1 NO...2</p> <p>14. Sweet potato YES...1 NO...2</p> <p>15. Yam, masoko YES...1 NO...2</p> <p>16. Sweet cassava YES...1 NO...2</p> <p>17. Cassava YES...1 NO...2</p> <p><i>Other</i></p> <p>18. Sugarcane YES...1 NO...2</p> <p>19. Banana &amp; Plantain YES...1 NO...2</p>	<p>20. Avocado YES...1 NO...2</p> <p>21. Francis mango YES...1 NO...2</p> <p>22. Mango (other) YES...1 NO...2</p> <p>23. Orange YES...1 NO...2</p> <p>24. Coconut palm YES...1 NO...2</p> <p>25. Coffee YES...1 NO...2</p> <p>26. Cocoa YES...1 NO...2</p>	<p>27. Lima beans YES...1 NO...2</p> <p>28. Blackeye peas YES...1 NO...2</p> <p>29. Eggplant YES...1 NO...2</p> <p>30. Watermelon YES...1 NO...2</p> <p>31. Pumpkin, zucchini, squash YES...1 NO...2</p> <p>32. Okra YES...1 NO...2</p> <p>33. Carrot and turnip YES...1 NO...2</p> <p>34. Red beetroot YES...1 NO...2</p> <p>35. Onions (including shallots) YES...1 NO...2</p> <p>36. Malanga, Taro YES...1 NO...2</p> <p>37. Pineapple YES...1 NO...2</p> <p>38. Breadfruit YES...1 NO...2</p> <p>39. Lemon &amp; lime YES...1 NO...2</p> <p>40. Grapefruit YES...1 NO...2</p> <p>41. Tangerines, mandarines, and clementines YES...1 NO...2</p> <p>42. Cashew YES...1 NO...2</p> <p>43. Pepper (capsicum spp.) YES...1 NO...2</p> <p>44. Papaya YES...1 NO...2</p> <p>45. Other (specify) _____</p> <p>46. Other (specify) _____</p>

MODULE D0: AGRICULTURAL PRODUCTION, GREAT RAINY SEASON: FEBRUARY THROUGH AUGUST 2015 - DIAGRAM

D01.: You know that in the country in general, there are 3 agricultural seasons :

- There is the great rainy season, where plantations are held in March and the harvest is held in June, sometimes after.
- There is the little rainy season, where plantations are held in July and harvest is held in November.
- And there is the dry season, where plantations are held in December (though sometimes as early as October), and the harvest is held in February.

INTERVIEWER: PLEASE USE THE SPACE BELOW TO DIAGRAM THE LAND WHERE THE HOUSEHOLD PRACTICED AGRICULTURE DURING THE GREAT RAINY SEASON, FROM FEBRUARY TO AUGUST 2015. THE PLOTS IDENTIFIED THROUGH THIS EXERCISE WILL BE USED FOR MODULE D. INDICATE THE LOCALITY OF EACH PLOT. NUMBER EACH PLOT.

A PLOT IS A CONTINUOUS PIECE OF LAND ON WHICH A UNIQUE CROP OR A MIXTURE OF CROPS IS GROWN UNDER A CONSISTENT CROP MANAGEMENT SYSTEM. IT MUST BE CONTINUOUS AND SHOULD NOT BE SPLIT BY A PATH OF MORE THAN ONE METER IN WIDTH. PLOT BOUNDARIES ARE DEFINED ACCORDING TO THE CROPS GROWN AND THE OPERATOR.



MODULE D. AGRICULTURAL PRODUCTION: PRIMARY SEASON 1 - GREAT RAINY SEASON: FEBRUARY THROUGH AUGUST 2015 (CONTINUED)														
CHECK D04:			D06	D07	D08	D09	D10	D11	D12	D13	D14			
TRANSFER THE PLOT CODE AND LOCALITY NAME AND FOR EACH PLOT THAT WAS FARMED, AS LISTED ON THE PREVIOUS PAGE.  ENSURE THAT YOU WRITE THE PLOT CODES IN THE SAME ORDER AS IN THE PREVIOUS PAGE.			How much did you pay for seeds to cultivate [CROP]?	How much did you pay for fertilizer to cultivate [CROP]?	How much did you pay for pesticides (against mice, caterpillars, rats, etc.) to cultivate [CROP]?	How much did you pay for land preparation (including rental of tools, machinery, animals, labor) to cultivate [CROP]?	How much did you pay for water/irrigation to cultivate [CROP]?	How much did you pay for labor (excluding labor for land preparation) to cultivate [CROP]?	How much did you pay for any other inputs to cultivate [CROP]?	How much [CROP] was lost to rodents, storms, flooding or theft prior to harvesting?	How much [CROP] was harvested?			
											AREONS	AREONS	AREONS	AREONS
_____		1												
		2												
		3												
		4												
_____		1												
		2												
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		4												
_____		1												
		2												
		3												
		4												
UNIT CODES (D13, 14)														
SMALL POT .....	01	BASKET .....	06	BUNCH (BANANA) .....	11									
LARGE POT .....	02	SMALL SACK (MADE FOR RICE) .....	07	DOZEN .....	12									
SMALL BUCKET .....	03	FLOUR SAK .....	08	MAKOUT .....	13									
BUCKET (5 GALLONS) .....	04	LARGE SACK (MADE FOR WHEA) .....	09	BARREL .....	14									
SMALL BASKET .....	05	PACK (BANANA) .....	10	DRUM .....	15	OTHER (SPECIFY)								

MODULE D. AGRICULTURAL PRODUCTION: PRIMARY SEASON 1 - GREAT RAINY SEASON: FEBRUARY THROUGH AUGUST 2015 (CONTINUED)																			
CROP		D15	D16		D17			D18		D19		D20		D21		D22		D23	
VERIFY COLUMN D04 AND CIRCLE THE CODES FOR ALL CROPS LISTED.  FOR ALL CIRCLED CODES, ASK QUESTIONS D15 THROUGH D23.		What type of processing did you apply to [CROP]? Did you use: Shelling, hulling, beating? A Drying? ..... B Milling or grinding? ... C Other? (SPECIFY) ... X Nothing ..... Y GO TO NEXT CROP: IF NONE, GO TO D17 (SELECT ALL APPLICABLE)	How much [CROP] was lost due to this processing?	What was your main method of storage for [CROP]? NONE ..... 00 UNPROTECTED PILE ..... 01 HEAPED IN HOUSE ..... 02 BAGS IN HOUSE ..... 03 TRADITIONAL SILO ..... 04 METALLIC SILO ..... 05 PROTECTED HUT ..... 06 UNPROTECTED HUT ..... 07 HUNG IN TREE ..... 08 OTHER (SPECIFY) ..... 96			How much [CROP] was lost to rotting, insects, rodents/pests, flood, theft, etc. in the post-harvest period? IF NO LOSSES, GO TO D20		What was the main reason for the loss of [CROP]? ROT ..... 1 INSECTS ..... 2 RODENTS/PESTS... 3 FLOOD ..... 4 THEFT ..... 5 OTHER (SPECIFY)..... 6		How much [CROP] was consumed by the household?		How much [CROP] was sold?		What was the total income you received for selling [CROP]? AREDONS		Who was the main buyer of your [CROP]? NO ONE ..... 0 RELATIVE ..... 1 LOCAL MARKET .... 2 PRIVATE TRADER... 3 AGRICULTURAL CO-OP ..... 4 OTHER (SPECIFY) ... 6		
				CODE	CROP	CODE	QUANTITY	UNIT	CODE	QUANTITY	UNIT	CODE	QUANTITY	UNIT	QUANTITY	UNIT	QUANTITY	UNIT	AREDON
01	Corn	A B C X Y																	
02	Rice	A B C X Y																	
03	Sorghum/millet	A B C X Y																	
04	Soybean	A B C X Y																	
05	Pigeon peas	A B C X Y																	
06	Groundnut	A B C X Y																	
07	Cabbage	A B C X Y																	
08	Lettuce	A B C X Y																	
09	Spinach	A B C X Y																	
10	Tomato	A B C X Y																	
11	Bell pepper	A B C X Y																	
12	Shallot, leek	A B C X Y																	
13	Potato	A B C X Y																	
14	Sweet potato	A B C X Y																	
15	Yam	A B C X Y																	
16	Sweet cassava	A B C X Y																	
17	Cassava	A B C X Y																	
18	Sugar cane	A B C X Y																	
19	Banana/plantain	A B C X Y																	

UNIT CODES (D16, 18, 20, 21)			
SMALL POT ..... 01	BASKET ..... 06	BUNCH (BANANA)..... 11	
LARGE POT ..... 02	SMALL SACK (MADE FOR RICE) 07	DOZEN ..... 12	
SMALL BUCKET ..... 03	FLOUR SAK ..... 08	MAKOUT ..... 13	
BUCKET (5 GALLONS) ..... 04	LARGE SACK (MADE FOR WHEAD)9	BARREL ..... 14	
SMALL BASKET ..... 05	PACK (BANANA)..... 10	DRUM ..... 15	OTHER (SPECIFY)..... 96

UNIT CODES (D16, 18, 20, 21)

MODULE G. ACCESS TO AGRICULTURAL INPUTS					
G01		G02		G03	
In the past 12 months, did you use (INPUT)?		Where did you obtain (INPUT)? (SELECT ALL THAT APPLY)		Were you able to obtain (INPUT) on time in the last 12 months?	
		Previous crop? ..... A Marketplace? ..... B Private store? ..... C Association? ..... D Donor project? ..... E Government (BAC,DDA, Mayor's Office, etc.)? ..... F Self? ..... G Other? (SPECIFY) ..... X			
INPUTS		CODE		YES	NO
A	Irrigated or pumped water? YES.....1 NO.....2	A B C D E F G X		1	2
B	Improved seeds? YES.....1 NO.....2	A B C D E F G X		1	2
C	Fertilizer? YES.....1 NO.....2	A B C D E F G X		1	2
D	Pesticides? YES.....1 NO.....2	A B C D E F G X		1	2
E	Paid labor? YES.....1 NO.....2	A B C D E F G X		1	2
F	Land preparation equipment, such as tractors or animals? YES.....1 NO.....2	A B C D E F G X		1	2

MODULE G. ACCESS TO AGRICULTURAL INPUTS (CONTINUED)					
NO.	QUESTIONS AND FILTERS	CATEGORY CODES			SKIP
G04	Is (are) your plot(s) mostly flat or sloped?	FLAT .....	1		G07
		SLOPED .....	2		
G05	What types of erosion control/water harvesting facilities are available on your plots?		WI	NON	PK
	Terraces	TERRACES	1	2	8
	Grass strip	GRASS STRIP	1	2	8
	Rock wall	ROCK WALL	1	2	8
	Dry walls	DRY WALLS	1	2	8
	Water catchment/impluvium	WATER CATCHMENT/IMPLUVIUM	1	2	8
	Vetiver grass	VETIVER GRASS	1	2	8
	Tree belts	TREE BELTS	1	2	8
	Hedgerows	HEDGEROWS	1	2	8
	Drainage ditches	DRAINAGE DITCHES	1	2	8
	Gully plugs	GULLY PLUGS	1	2	8
	Contour farming	CONTOUR FARMING	1	2	8
	Something else?	OTHER _____	1	2	8
		(SPECIFY)			
G06	What is the agricultural usage of the plot(s)? Do you grow...:		WI	NON	PK
	Dense trees/shrubs (mango, oak, mahogany, coffee, cocoa, citrus...)?	DENSE TREES/SHRUBS	1	2	8
	Dispersed trees/shrubs (mango, oak, mahogany, coffee, cocoa, citrus...)?	DISPERSED TREES/SHRUBS	1	2	8
	Bananas?	BANNANN	1	2	8
	Food producing crops (rice, beans, peas, cassava, yam, potato, sweet potato, vegetables, etc.)?	KILTIPOU MANJE	1	2	8
	Patiray?	PATIRAY	1	2	8
	Fallow?	JACHE	1	2	8
	Something else?	LOT _____	1	2	8
		(PRESIZE)			
G07	In the past year, did you:		WI	NON	PK
	Participate in an agricultural work group, "sosye"?	PARTICIPATE IN AG WORK GROUP	1	2	8
	Participate in a konbit for agricultural work?	PARTICIPATE IN A KONBIT	1	2	8
	Hold a konbit to invite others to come and work for you?	HOLD A KONBIT	1	2	8
	Sell days or mornings of your time as a member of a group (squad, or other) ?	SELL LABOUR DAYS: GROUP MEMBER	1	2	8
	Purchase the labor of a group of workers (squad or others)?	PURCHASE LABOR OF WORKERS	1	2	8
	Sell days or mornings of labor for yourself?	SELL LABOR DAYS: FOR YOURSELF	1	2	8
	Purchase days or mornings of workers' labor to work on your own land?	PURCHASE LABOR TO WORK OWN LAND	1	2	8

## MODULE J. AGRICULTURAL TECHNOLOGIES

CHECK QUESTIONNAIRE MODULE D1, E1, AND F1 TO DETERMINE IF THE DIRECT BENEFICIARY PLANTED SOY BEANS OR GROUNDNUT IN THE PAST YEAR.

- IF THE BENEFICIARY **DID NOT PLANT GROUNDNUTS OR SOY BEANS** IN THE PAST YEAR, THANK THE RESPONDENT FOR THEIR TIME AND END THE INTERVIEW.
- IF THE BENEFICIARY **DID PLANT GROUNDNUTS OR SOY BEANS** LAST YEAR, CONTINUE WITH QUESTION J1.01.

"Next I would like to ask you about some of the crops you planted in the past one year."

NO.	QUESTION	RESPONSE
J1.01	CHECK MODULE D1, E1, AND F1: DID RESPONDENT CULTIVATE GROUNDNUT IN THE PAST ONE YEAR?	YES.....1 NO.....2 → SKIP TO J2.01
J1.02	What kind of land preparation did you use for the groundnut you planted in the past year?  SELECT ALL THAT APPLY	NONE.....A → J1.07 ZERO TILLAGE.....B PLOUGHING.....C  OTHER (SPECIFY).....Z
J1.03	CHECK J1.02: DID RESPONDENT USE ZERO TILLAGE TO PREPARE THE LAND?	YES.....1 NO.....2 → J1.05
J1.04	What kind of zero tillage system did you use for the groundnut?  SELECT ALL THAT APPLY	SLASH AND PLANT.....A BURN AND PLANT.....B HERBICIDE AND PLANT.....C  OTHER (SPECIFY).....Z
J1.05	CHECK J1.02: DID RESPONDENT USE PLOUGHING TO PREPARE THE LAND?	YES.....1 NO.....2 → J1.07
J1.06	What did you use for ploughing for the groundnut?  SELECT ALL THAT APPLY	HAND TILLAGE (HOE).....A ANIMAL TRACTION.....B TRACTOR.....C  OTHER (SPECIFY).....Z
J1.07	What was your main source of groundnut seed?	HOME- SAVED (SELF/FRIEND/RELATIVE).....1 PURCHASED FROM FRIEND/RELATIVE.....2 PURCHASED FROM AG DEALER.....3 PURCHASED IN MARKET (NON-AG DEALER).....4 AID DISTRIBUTION.....5  OTHER (SPECIFY).....6

NO.	QUESTION	RESPONSE
J1.08	CHECK J1.07: DID RESPONDENT PURCHASE GROUNDNUT SEED FROM AN AGRICULTURAL OR NON-AGRICULTURAL DEALER (3 OR 4)?	YES .....1 NO .....2 → J1.10
J1.09	Please tell me the name of the dealer from which you purchased the groundnut seed.	NAME OF GROUNDNUT SEED DEALER (SPECIFY).....1  DON'T KNOW .....8
J1.10	CHECK J1.07: DID RESPONDENT PURCHASE GROUNDNUT SEED FROM A FRIEND OR RELATIVE (2)?	YES .....1 NO .....2 → J1.12
J1.11	Why did you purchase groundnut seed from a friend or relative?	LESS EXPENSIVE .....1 MORE ACCESSIBLE THAN MARKET/DEALER .....2 QUALITY OF GROUNDNUT YIELD IS GOOD .....3  OTHER (SPECIFY).....6
J1.12	What type of groundnut seed did you plant in the past year? SELECT ALL THAT APPLY	OPEN POLLINATED VARIETIES (OPVs).....A HYBRID.....B DON'T KNOW .....X
J1.13	Was the groundnut crop grown to provide food for the household, or was it grown to be sold or traded in the market?	GROWN FOR FOOD ONLY .....1 GROWN FOR MARKET ONLY .....2 GROWN FOR BOTH FOOD & MARKET .....3  OTHER (SPECIFY) .....6
J1.14	Some farmers plant groundnut seeds in rows or randomly broadcast or plant with other crops growing in the plot. How did you plant the groundnut seeds? SELECT ALL THAT APPLY	IN ROWS .....A RANDOMLY BROADCAST .....B PLANTED WITH OTHER CROPS GROWING IN THE PLOT .....C
J1.15	Over the past two planting seasons did you rotate groundnut with other crop(s) in the same plot area?	YES .....1 NO .....2  OTHER (SPECIFY) .....6  DON'T KNOW .....8
J1.16	Did you apply fertilizer to the groundnut in the past year?	YES .....1 NO .....2 → J1.19
J1.17	At which times did you apply fertilizer to the groundnut? SELECT ALL THAT APPLY	PLANTING .....A MID-CROP .....B OTHER (SPECIFY).....Z

NO.	QUESTION	RESPONSE		
J1.18	What type of fertilizer did you use? SELECT ALL THAT APPLY	ORGANIC .....A INORGANIC.....B FOLIAR FEEDS.....C OTHER (SPECIFY).....Z		
J1.19	Inorganic fertilizer is a man-made fertilizer that you can buy in a bag at the shop. Have you been trained in how to use and apply inorganic fertilizer for groundnut?	YES .....1 NO.....2		
J1.20	Did you have any insect, rodent or disease attacks on your groundnut in the past year?	YES .....1 NO.....2		
J1.21	Did you use chemicals to control insect, rodent or disease attacks on the groundnut?	YES .....1 NO.....2 → J1.23		
J1.22	Was the use of chemicals preventive, or was it in response to an insect, rodent or disease attack?	PREVENTIVE/ROUTINE .....1 RESPONSE TO ATTACK.....2		
J1.23	Have you been trained in when to use and how to apply pesticides for groundnut?	YES .....1 NO.....2		
J1.24	How many times did you control weeds among your groundnut crops in the past year?	NUMBER OF TIMES: <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td style="width: 20px; height: 20px;"></td><td style="width: 20px; height: 20px;"></td></tr></table> NONE .....95 → J1.26		
J1.25	How did you control the weeds among your groundnut crops? SELECT ALL THAT APPLY	HOE .....A HERBICIDE.....B MULCHING.....C INTERCROPPING .....D SLASHING .....E PULL BY HAND .....F		
J1.26	Have you been trained in when to use and how to apply herbicides for groundnut?	YES .....1 NO.....2		
J1.27	In the past year, did you use any of the following techniques to manage soil and water for your groundnut crop? SELECT ALL THAT APPLY Terracing? Mulching?	TERRACING .....A MULCHING.....B SOIL BANDS/TRENCHES.....C		

	Soil bands or trenches? Intercropping? Crop rotation?  Some other technique? IF YES: What was the technique?	INTERCROPPING ..... D CROP ROTATION ..... E  NONE ..... X OTHER (SPECIFY) _____ Z
J1.28	Besides rainfall, did you use any additional irrigation methods for the groundnut?	YES ..... 1 NO ..... 2 → J1.30
J1.29	What type of irrigation did you use?  SELECT ALL THAT APPLY	BY HAND (WATERING CAN, HOSE, ETC.) ..... A CANALS ..... B PERMANENT HOSE ..... C PUMPS ..... D  OTHER (SPECIFY) _____ Z
J1.30	How did you harvest the groundnut?	BY HAND ONLY ..... 1 WITH A MACHINE ONLY ..... 2 SOME BY HAND, SOME WITH A MACHINE ..... 3 NOT YET HARVESTED ..... 4
J1.31	Did you dry any of your groundnut harvest before sale or use?	YES ..... 1 NO ..... 2 → J1.33
J1.32	What did you dry the groundnut on?  SELECT ALL THAT APPLY	BARE GROUND ..... A GROUND PLASTERED WITH COW DUNG ..... B GROUND COVERED WITH STRAW ..... C LEFT TO DRY ON PLANT IN FIELD ..... D TARPAULINS ..... E DRYING YARD ..... F DRYING RACKS ..... G SOLAR DRYERS ..... H MECHANIZED DRYERS ..... I  OTHER (SPECIFY) _____ Z
J1.33	How did you shell the groundnut?  SELECT ALL THAT APPLY	BY HAND ONLY ..... A BY STICKS ..... B WITH A SHELLING MACHINE ..... C DID NOT SHELL ..... D  OTHER (SPECIFY) _____ Z
J1.34	Did you put the groundnut in bags after harvest for storage or transport?	YES ..... 1 NO ..... 2 → J1.36
J1.35	What type of storage bag did you use for the groundnut?	WOVEN BAG, SINGLE LAYER ..... 1 TWO- OR THREE-LAYERED WOVEN BAGS ..... 2 HERMETIC BAG ..... 3

J1.36	<p>Did you use any of the following storage locations to store the groundnut?</p> <p>SELECT ALL THAT APPLY</p> <p>Residential house? Cribs? Granaries? Other constructed stores? Warehouses? Storage silos?</p> <p>Some other type of location? IF YES: What was the storage location you used?</p>	<p>RESIDENTIAL HOUSE..... A CRIBS ..... B GRANARIES ..... C OTHER CONSTRUCTED STORES ..... D WAREHOUSES ..... E STORAGE SILOS ..... F</p> <p>NONE/DID NOT STORE ANY GROUNDNUT ..... X → SKIP TO J2.01</p> <p>OTHER (SPECIFY) _____ Z</p>		
J1.37	<p>Was your groundnut attacked by insects, rodents or disease while in storage?</p>	<p>YES ..... 1 NO ..... 2</p>		
J2.01	<p>CHECK MODULE D1, E1, AND F1: DID RESPONDENT CULTIVATE SOY BEANS IN THE PAST ONE YEAR?</p>	<p>YES ..... 1 NO ..... 2 → SKIP TO END</p>		
J2.01A	<p>How many varieties of soy beans did you cultivate?</p>	<p>NUMBER OF VARIETIES CULTIVATED:</p> <table border="1" data-bbox="1097 1031 1214 1094"> <tr> <td style="width: 20px; height: 20px;"></td> <td style="width: 20px; height: 20px;"></td> </tr> </table> <p>DON'T KNOW ..... 98</p>		
J2.02	<p>What kind of land preparation did you use for the beans you planted in the past year?</p> <p>SELECT ALL THAT APPLY</p>	<p>NONE ..... A → J2.07 ZERO TILLAGE ..... B PLOUGHING ..... C OTHER (SPECIFY) _____ Z</p>		
J2.03	<p>CHECK J2.02: DID RESPONDENT USE ZERO TILLAGE TO PREPARE THE LAND?</p>	<p>YES ..... 1 NO ..... 2 → J2.05</p>		
J2.04	<p>What kind of zero tillage system did you use for the soy beans?</p> <p>SELECT ALL THAT APPLY</p>	<p>SLASH AND PLANT ..... A BURN AND PLANT ..... B HERBICIDE AND PLANT ..... C OTHER (SPECIFY) _____ Z</p>		
J2.05	<p>CHECK J2.02: DID RESPONDENT USE PLOUGHING TO PREPARE THE LAND?</p>	<p>YES ..... 1 NO ..... 2 → J2.07</p>		
J2.06	<p>What did you use for ploughing for the soy beans?</p> <p>SELECT ALL THAT APPLY</p>	<p>HAND TILLAGE (HOE) ..... A ANIMAL TRACTION ..... B TRACTOR ..... C OTHER (SPECIFY) _____ Z</p>		

J2.07	What was your main source of soy bean seed?	HOME- SAVED (SELF/FRIEND/RELATIVE) .....1 PURCHASED FROM FRIEND/RELATIVE .....2 PURCHASED FROM AG DEALER .....3 PURCHASED IN MARKET (NON-AG DEALER) .....4 AID DISTRIBUTION.....5  OTHER (SPECIFY)_____ .....6
J2.08	CHECK J2.07: DID RESPONDENT PURCHASE SOY BEAN SEED FROM AN AGRICULTURAL OR NON-AGRICULTURAL DEALER (3 OR 4)?	YES .....1 NO .....2 → J2.10
J2.09	Please tell me the name of the dealer from which you purchased the bean seed.	NAME OF SOY BEAN SEED DEALER (SPECIFY)_____ .....1  DON'T KNOW .....8
J2.10	CHECK J2.07: DID RESPONDENT PURCHASE SOY BEAN SEED FROM A FRIEND OR RELATIVE (2)?	YES .....1 NO .....2 → J2.12
J2.11	Why did you purchase soy bean seed from a friend or relative?	LESS EXPENSIVE .....1 MORE ACCESSIBLE THAN MARKET/DEALER .....2 QUALITY OF BEAN YIELD IS GOOD .....3  OTHER (SPECIFY)_____ .....6
J2.12	What type of bean seed did you plant in the past year? SELECT ALL THAT APPLY	OPEN POLLINATED VARIETIES (OPVs)..... A HYBRID.....B DON'T KNOW .....X
J2.13	Was the soy bean crop grown to provide food for the household, or was it grown to be sold or traded in the market?	GROWN FOR FOOD ONLY .....1 GROWN FOR MARKET ONLY .....2 GROWN FOR BOTH FOOD & MARKET .....3  OTHER (SPECIFY) _____ .....6
J2.14	Some farmers plant soy bean seeds in rows, or randomly broadcast, or plant with other crops growing in the plot.  How did you plant the bean seeds?  SELECT ALL THAT APPLY	IN ROWS ..... A RANDOMLY BROADCAST ..... B PLANTED WITHIN OTHER CROPS GROWING IN THE PLOT..... C
J2.15	Over the past two planting seasons did you rotate soy beans with other crop(s) in the same plot area?	YES .....1 NO .....2

		OTHER (SPECIFY) _____ 6 DON'T KNOW .....8		
J2.16	Did you apply fertilizer to the soy beans in the past year?	YES ..... 1 NO ..... 2 → J2.19		
J2.17	At which times did you apply fertilizer to the soy beans? SELECT ALL THAT APPLY	PLANTING ..... A MID-CROP ..... B OTHER (SPECIFY) _____ Z		
J2.18	What type of fertilizer did you use? SELECT ALL THAT APPLY	ORGANIC ..... A INORGANIC ..... B FOLIAR FEEDS ..... C OTHER (SPECIFY) _____ Z		
J2.19	Inorganic fertilizer is a man-made fertilizer that you can buy in a bag at the shop. Have you been trained in how to use and apply inorganic fertilizer for soy beans?	YES ..... 1 NO ..... 2		
J2.20	Did you have any insect, rodent or disease attacks on your soy beans in the past year?	YES ..... 1 NO ..... 2		
J2.21	Did you use chemicals to control insect, rodent or disease attacks on the soy beans?	YES ..... 1 NO ..... 2 → J2.23		
J2.22	Was the use of chemicals preventive, or was it in response to an insect, rodent or disease attack?	PREVENTIVE/ROUTINE ..... 1 RESPONSE TO ATTACK ..... 2		
J2.23	Have you been trained in when to use and how to apply pesticides for beans?	YES ..... 1 NO ..... 2		
J2.24	How many times did you control weeds among your soy bean crops in the past year?	NUMBER OF TIMES: <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td style="width: 20px; height: 20px;"></td><td style="width: 20px; height: 20px;"></td></tr></table> NONE ..... 95 → J2.26		
J2.25	How did you control the weeds among your soy bean crops? SELECT ALL THAT APPLY	HOE ..... A HERBICIDE ..... B MULCHING ..... C INTERCROPPING ..... D SLASHING ..... D PULL BY HAND ..... E		

J2.26	Have you been trained in when to use and how to apply herbicides for soy beans?	YES .....1 NO .....2
J2.27	In the past year, did you use any of the following techniques to manage soil and water for your soy bean crop?  SELECT ALL THAT APPLY  Terracing? Mulching? Soil bands or trenches? Intercropping? Crop rotation? Row planting?  Some other technique? IF YES: What was the technique?	TERRACING ..... A MULCHING ..... B SOIL BANDS/TRENCHES ..... C INTERCROPPING ..... D CROP ROTATION ..... E ROW PLANTING ..... F  NONE ..... X OTHER (SPECIFY) _____ Z
J2.28	Besides rainfall, did you use any irrigation for the soy beans?	YES ..... 1 NO ..... 2 → J2.30
J2.29	What type of irrigation did you use?  SELECT ALL THAT APPLY	BY HAND (WATERING CAN, HOSE, ETC.) ..... A CANALS ..... B PERMANENT HOSE ..... C PUMPS ..... D  OTHER (SPECIFY) _____ Z
J2.30	How did you harvest the soy beans?	BY HAND ONLY .....1 WITH A MACHINE ONLY .....2 SOME BY HAND, SOME WITH A MACHINE .....3 NOT YET HARVESTED .....4
J2.31	Did you dry any of your soy bean harvest before sale or use?	YES ..... 1 NO ..... 2 → J2.33
J2.32	What did you dry the soy beans on?  SELECT ALL THAT APPLY	BARE GROUND ..... A GROUND PLASTERED WITH COW DUNG ..... B LEFT TO DRY ON PLANT IN FIELD ..... C TARPULINS ..... D DRYING YARD ..... E DRYING RACKS ..... F SOLAR DRYERS ..... G MECHANIZED DRYERS ..... H  OTHER (SPECIFY) _____ Z

J2.33	How did you shell the soy beans? SELECT ALL THAT APPLY	BY HAND ONLY ..... A BY STICKS ..... B WITH A SHELLING MACHINE ..... C DID NOT SHELL ..... D  OTHER (SPECIFY) _____ Z
J2.34	Did you put the soy beans in bags after harvest for storage or transport?	YES ..... 1 NO ..... 2 → J2.36
J2.35	What type of storage bag did you use for the soy beans?	WOVEN BAG, SINGLE LAYER ..... 1 TWO- OR THREE-LAYERED WOVEN BAGS ..... 2 HERMETIC BAG ..... 3
J2.36	Did you use any of the following storage locations to store the soy beans? SELECT ALL THAT APPLY  Residential house? Cribs? Granaries? Other constructed stores? Warehouses?  Some other type of location? IF YES: What was the storage location you used?	RESIDENTIAL HOUSE ..... A CRIBS ..... B GRANARIES ..... C OTHER CONSTRUCTED STORES ..... D WAREHOUSES ..... E  NONE/DID NOT STORE ANY BEANS ..... X → SKIP TO J3.01  OTHER (SPECIFY) _____ Z
J2.37	Were your soy beans attacked by insects, rodents or disease while in storage?	YES ..... 1 NO ..... 2

CONCLUDE THE INTERVIEW:

"Thank you very much for your time in responding to this survey. Your contributions are greatly appreciated."

	Accuracy	Cost	Equipment required	Expertise needed	Level of effort	Plot size
<b>Tape and compass</b>	medium-high	medium; varies with quality	low	low-medium	medium-high	< .5 ha
<b>GPS</b>	high	med-high; varies with quality	high	medium	medium	> .5 ha*
<b>Pacing</b>	low-medium	low	low	low	medium	small-medium
<b>Farmer estimates</b>	low-medium; high w/correction factor	low	low	low	low	small
<b>Remote sensing</b>	low	high	high	high	medium	very large

## Measuring Estimating Area Challenge



Group Exercise  
90 minutes

Materials required: marbles, sturdy measuring tape, handheld GPS unit (extra AA batteries), pencil and paper (Rite-in-Rain notebook preferred), Google Earth sketch of plot to be measured.

### Group 1 – Measuring Area by Pacing<sup>4</sup> (Army Study Guide)

A pace is equal to one natural step, about 30 inches long or 0.76 meters. One way to measure ground distance is the pace count. To accurately use the pace count method, you must know how many paces it takes you to walk 10 meters. To determine this, you must walk an accurately measured course using your measuring tape and count the number of paces you take. A pace course can be as short as 10 meters or as long as 600 meters. The pace course, regardless of length, must be on similar terrain to that you will be walking over. It does no good to walk a course on flat terrain and then try to use that pace count on hilly terrain.

To determine your pace count on a 10-meter course, count the paces it takes you to walk the 10 meters. Do this three times and then average out the results 30/number of paces. The answer will give you the average paces it takes you to walk 30 meters. It is important that each person who navigates knows her pace count.

(1) There are many methods to keep track of the distance traveled when using the pace count. Some of these methods are: put a pebble in your pocket every time you have walked 10 meters according to your pace count; tie knots in a string; or put marks in a notebook. Do not try to remember the count; always use one of these methods or design your own method.

(2) Certain conditions affect your pace-count in the field, and you must allow for them by making adjustments.

- Slopes. Your pace lengthens on a downslope and shortens on an upgrade. Keeping this in mind, if it normally takes you 120 paces to walk 100 meters, your pace count may increase to 130 or more when walking up a slope.
- Winds. A head wind shortens the pace and a tail wind increases it.
- Surfaces. Sand, gravel, mud, snow, and similar surface materials tend to shorten the pace.
- Elements. Falling snow, rain, or ice can cause the pace to be reduced in length.
- Clothing. Excess clothing and boots with poor traction affect the pace length.
- Visibility. Poor visibility such as in fog, rain, or darkness, will shorten your pace.

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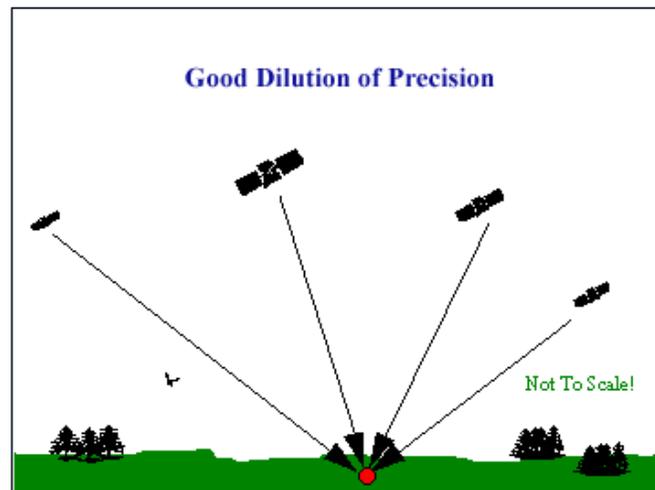
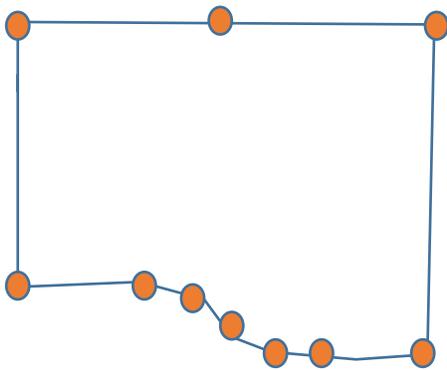
<sup>4</sup> [http://www.armystudyguide.com/content/army\\_board\\_study\\_guide\\_topics/land\\_navigation\\_map\\_reading/how-to-use-pace-count-to-.shtml](http://www.armystudyguide.com/content/army_board_study_guide_topics/land_navigation_map_reading/how-to-use-pace-count-to-.shtml)

Calculate the area of the “plot part 1” rectangle by multiplying length x width.

Calculate the area “plots part 2 and 3” triangles  $A = \frac{h_b \cdot b}{2}$ . See cheat sheet for further instructions on calculating area of triangle.

## Group 2 –Measuring Area with a GPS Unit

Turn on your GPS unit – check settings and make sure the unit is set to collect points in decimal degrees, and the correct<sup>5</sup> datum (WGS 84) is set and you have at least 4 satellites with good dilution of precision or “geometry” (satellites are not clustered together). Walk the perimeter of the plot stopping every 3-4 meters (10-13 feet) on straight edges and every 1-2 meters (3-7 feet) on curved edges to collect points. Be sure to capture the corners of the plot. Stand holding the GPS unit at each point collection location for at least 2 minutes.



## Group 3 - Farmer's Estimate:

Group members will estimate the size of the plot and then try to predict what quantity of maize they expect to harvest this year (prediction). Record the amount in yield per acre. In the U.S. this is measured in bushels/acre. We will use NASS 2016 QuickStats<sup>6</sup> Virginia average yield per acre of 161 bushels/acre. NOTE: In your own country you would use the local unit of measurement for both area and yield. Consult with Group #1 (Pacing Measurement) and compare results on the estimated size of the plot versus direct measurement.

<sup>5</sup> Africa: <http://earth-info.nga.mil/GandG/coordsys/onlinedatum/CountryAfricaTable.html>  
GPS Datum List: <http://therucksack.tripod.com/MiBSAR/LandNav/Datums/GarminMapDatumList.pdf>

<sup>6</sup> 2015 STATE AGRICULTURE OVERVIEW: [https://www.nass.usda.gov/Quick\\_Stats/Ag\\_Overview/stateOverview.php?state=virginia](https://www.nass.usda.gov/Quick_Stats/Ag_Overview/stateOverview.php?state=virginia)



## How to ...

### How to calculate an area in the field

You may need to calculate an area in the field, particularly for mapping a weed infestation or working out how much herbicide you need to mix to treat weeds.



#### Measuring an area

There are two ways you can measure an area:

1. Use a tape measure to get an accurate measurement.
2. Pace out the distance as best you can to get an estimation.

The unit used for measuring an area is a metre (m).

If you want to use the 'pacing out' method to measure an area you should first practise stepping out against a measured distance of 10m.

Here's how you do it:



**1**  
Measure out 10m.



**2**  
Use a natural stride to pace out 10m.



**3**  
Work out the number of paces taken in 10m.



Use a natural stride to pace out 10m. To get an accurate measurement don't force an overextended step. Make sure you do it several times to find your natural rhythm and pace length.

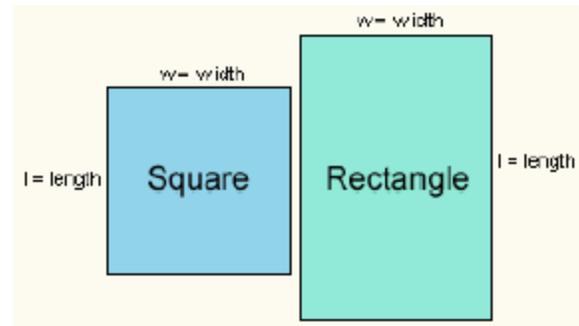
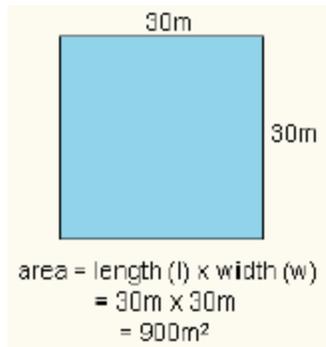
#### Calculating regular shapes

The area of a regular shape is calculated using the following formula:

$$\text{Area} = \text{length} \times \text{width}$$

The area is shown in square metres (m<sup>2</sup>). For example, to calculate the area of a plot of land, use the following formula:

[https://www.dlswb.rmit.edu.au/toolbox/conservation/html/pages/website/how\\_to/howto\\_11.htm](https://www.dlswb.rmit.edu.au/toolbox/conservation/html/pages/website/how_to/howto_11.htm)

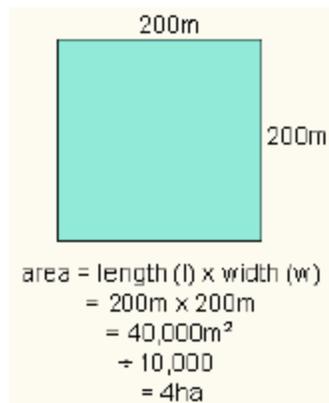
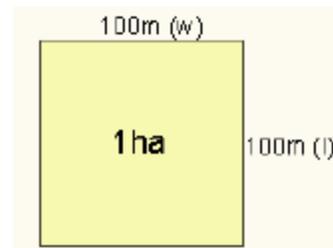


### Calculating areas in hectares

You can think of a hectare (ha) as measuring 100m by 100m.

Take the figure you have worked out in square metres (m<sup>2</sup>), then divide by 10,000 to find the number of hectares (ha).

For example, to calculate a larger area of land in hectares, use the following formula:



Use a calculator to convert an area in square metres (m<sup>2</sup>) into hectares (ha).



# GPS Field Protocol:

What you need to know when using a GPS unit for fieldwork

Global Positioning Systems (GPS) is a common way to collect location data for agricultural, urban, and natural resources. It is made up of a constellation of 24 satellites used for civilian GPS, which accurately determine your location (X, Y, Z) in any weather, day or night, anywhere on Earth. A GPS unit uses four or more satellites to triangulate your position on Earth. For this reason, you need four or more satellites! GPS satellite signals travel by line of sight, and will pass through clouds, glass, & plastic, but NOT through most solid objects, such as buildings & mountains.

## Your GPS accuracy depends on:

### The type of GPS unit you have

If you have a handheld GPS unit (e.g. Garmin), the highest attainable horizontal accuracy is about 3 m. More accurate units like Trimble's GeoXH, will give you accuracy of < 3 m, sometimes sub-meter accuracy under good conditions or with additional antennas. More expensive units are not *always* the most accurate – many have reported that Garmin handhelds give better accuracy under heavy canopy than do more advanced Trimble units.

*Recommendation:* buy the most affordable (and dependable) GPS that best suits your accuracy requirements!

### Number of satellites visible to your receiver

Buildings, terrain, or sometimes even dense foliage can block signal reception, causing position errors or possibly no position reading at all. Also, signal multipath might happen if a signal from a satellite is reflected off objects such as tall buildings or large rock surfaces before it reaches the receiver. This increases the travel time of the signal, causing errors.

*Recommendation:* The more satellites, the better – but you must have four or more before you record a point! If you cannot get four or more, wait a few minutes for the satellites to move/adjust, or move to an area with better reception and make note of distance and direction moved from the desired point.

### Strength of satellite signals

While many GPS units do not give you a measurement of satellite signal strength, you can get an idea of it by viewing the satellite screen on most GPS units, which depicts signal strength with bar graphs for each visibly satellite.

*Recommendation:* The stronger the signals, the better – just make sure you have four or more satellite signals before you record a point!

### Geometric positioning of the satellites in the sky

Ideal satellite geometry exists when the satellites are located at wide angles relative to each other in the sky, which improves triangulation and thus reduces error. While Trimble units give a measurement for satellite geometry ("PDOP," "HDOP," or "GDOP"), handheld units do not give a measurement for it – it is a good idea to be aware that accuracy will improve when satellites are distributed in different areas of the sky.

*Recommendation:* Aim for the satellites to be widely distributed across the skyplot on your GPS unit.

### Differential correction procedures

Wide-Area Augmentation System (WAAS) is available on many GPS units (see "Handheld GPS Buyer's Guide" for more info), and on all Trimble receivers. WAAS can improve GPS accuracy to within 2 m for compatible handheld GPS units, and to less than 1 m with Trimble units. However, it's only available in North America, and you need an unobstructed view of the southern horizon, so it's ideal for open land (such as open agricultural crops) and marine applications. You know you are receiving WAAS signal if you are receiving signals from satellites with ID numbers 31 or higher (in the skyplot). Differential GPS (DGPS) is available for Trimble units (and for PDAs with ArcPad and GPS Correct software) and can improve accuracy to about 1 cm.

*Recommendation:* Only enable WAAS if you have an open view of the southern horizon – if you have WAAS enabled without a clear view, your accuracy will be reduced because the GPS unit is constantly trying to find the WAAS satellites. As for DGPS, use it if you have access to DGPS correction (either real-time or post-processed), and you want sub-meter accuracy.



Pictured here is a Garmin GPSmap 60CSx as an example of the satellite screen, which all GPS devices contain.  
Image credit: Garmin.com

<http://gjf.berkeley.edu>

## What format should I use to collect GPS data?

The most important things about collecting GPS are to be consistent and to document your data. That way, data can be easily used with other data with minimal adjustments, and people who use your data in the future (including you) can know exactly what format (projection and datum) you used to collect the data. If you do not document your data, it is possible that it will be unusable in the future!

### All geographic data has a projection and a datum:

- Projection is how the 3D earth is mapped on a 2D surface, like a map on paper or your computer screen. GPS units call it the "Position Format" or "Coordinate System."
- Datum is the mathematical model that fits the earth to an ellipsoid. Most GPS units call it the "Datum" or "Map Datum."

#### Recommendations:

- Use the projection: UTM (stands for Universal Transverse Mercator)
- Use the datum: NAD 83 (stands for North American Datum 1983)
- Using other projections (like Latitude-Longitude or Stateplane) and other datum (like WGS 84) is okay – just be sure you record whatever projection and datum you used!
- If you decide to use Latitude-Longitude, try to collect in decimal-degrees (hddd.dddd°) as the Position Format.

#### GPS Accuracy:

- Accuracy is how close you are to the real-world location. It is also called the offset or the error. On most handheld units, accuracy is represented by a "error buffer," e.g.  $\pm 14\text{ft}$  or  $\pm 11\text{m}$ .
- Your GPS accuracy depends on many things; see other side.
- When we talk about accuracy, usually we mean horizontal accuracy. There is also vertical accuracy, which is how close you are to the real-world elevation at a given location. Vertical accuracy is usually somewhat inaccurate with handheld GPS unit (10-200m), while it is more accurate with more advanced Trimble units (<5m). For sub-meter vertical accuracy, survey-grade GPS equipment is required.

### Things to Remember:

1. Be consistent with what projection and datum you use to collect data.
2. When in doubt, or if starting a new project, use UTM projection with NAD 83 datum.
3. Only record a point if you have 4 or more satellites.
4. Record accuracies on your field sheet since you can't always transfer these digitally.

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### How do I set my GPS projection & datum?

All GPS units have a Setup menu, where you can set the projection and datum. Check the GPS unit's manual for detailed instructions. Below is a screenshot from

Garmin's Setup | Units menu:

The screenshot shows a red-themed menu with the following items: Position Format (set to UTM UPS), Map Datum (set to NAD83), Distance/Speed (set to Metric), Elevation (Vert. Speed) (set to Meters (m/min)), Depth (set to Meters), and Temperature (set to Fahrenheit). Annotations with arrows point to these settings: 'Set the projection here. For UTM, set to UTM UPS. For Lat/Long, set to hddd.dddd°.' points to UTM UPS; 'Set the datum here. For NAD 83 or WGS 84..' points to NAD83; 'Set the distance units here, either meters or feet. If you use UTM, use meters as the units.' points to Metric.

### Recording GPS Information

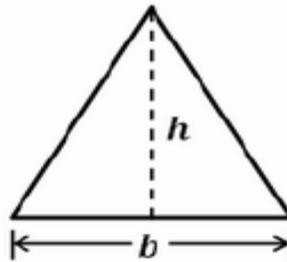
- UTM:
  - » Easting (e.g. 0525690)
  - » Northing (e.g. 4286289)
  - » Accuracy (e.g.  $\pm 11\text{m}$ )
- Latitude, Longitude:
  - » Latitude (e.g. 37.867242) with 5-6 decimals
  - » Longitude (e.g. 122.300746) with 5-6 decimals
  - » Accuracy (e.g.  $\pm 11\text{m}$ )
- Backup  
It is always a good idea to record GPS coordinates and any other data on paper/notebook in the field if possible, just in case of data loss after accidental damage. (Damage is less common with rugged units, such as Garmin handhelds or the Trimble Recon.)

If you do record GPS coordinates, write both the X (Easting or Latitude), the Y (Northing or Longitude), and the accuracy, e.g.  $\pm 11\text{m}$ .



### Area of a Triangle

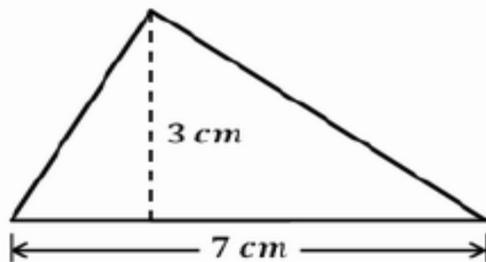
(Solve Using Base and Height)



$$\text{Area} = \frac{1}{2} (b \times h)$$

*b = base of the triangle*  
*h = height of the triangle*

**Example:**



$$\begin{aligned} A &= \frac{1}{2} (b \times h) \\ &= \frac{1}{2} (7 \times 3) \\ &= \frac{1}{2} (21) \\ &= 10.5 \text{ cm}^2 \end{aligned}$$

## BIOGRAPHIES –



**Anna Brenes** began work in July 2012 with USAID | Haiti as the GIS Mapping and Reporting Specialist where she assisted M&E teams with data collection, analyses, and management using the Haiti DevResults information management systems. She joined the USAID/BFS/SPPM/MEL team in January 2016 as a Data Support Specialist. Prior to working with USAID, Ms. Brenes worked with the State of Minnesota as a GIS Analyst. She has lived abroad with her husband and children in Morocco, Bolivia, and the Netherlands. Ms. Brenes has an undergraduate BA degree from the University of Wisconsin, Madison in International Relations, and a graduate MS degree in Agriculture Education/Sustainable Community Development from the University of Wisconsin, River Falls.



**Kiersten B. Johnson, PhD**, is a social demographer working in the field of international development. She served nearly 20 years as a researcher for USAID's Bureau for Global Health MEASURE DHS project, analyzing Demographic and Health Surveys (DHS) and Service Provision Assessment health facility data. She later expanded the use of DHS data to support the work of the US Global Climate Change Initiative and USAID's Office of Forestry and Biodiversity, integrating NASA's satellite remote-sensing data into the DHS to explore associations among climate, environment, and health and nutrition outcomes. More recently, she has supported the US Government's Feed the Future Initiative through assisting USAID's Bureau for Food Security to implement population-based surveys and impact evaluations related to agriculture and nutrition. She currently serves as a senior Monitoring and Evaluation Advisor in USAID's Bureau for Food Security. Kiersten has published on topics including child nutrition, food security, impacts of socioeconomic inequalities on development outcomes, gender, climate change and biodiversity, HIV/AIDS, health systems, maternal and child health and survival, and malaria. She has worked in numerous countries throughout Africa, Asia, and Latin America and the Caribbean.



## **FOR MORE INFORMATION:**

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**Monitoring, Evaluation and Learning**

**Bureau of Food Security**

**USAID**