A GUIDE TO THE 50x2030 DATA COLLECTION APPROACH: QUESTIONNAIRE DESIGN

DRAFT FOR INTERNAL DISCUSSION

This version: October 9, 2020

Table of Contents

I. Introduction

The 50x2030 Initiative to Close the Agricultural Data Gap aims to empower and support 50 low- and lower middle-income countries (L/LMICs) to build strong national data systems that produce and use high quality, timely agricultural survey data. Effective investment and policy-making around agriculture and poverty requires an evidence-based foundation. In many L/LMICs, limitations in the scope, quality, and frequency of agricultural data severely constrain the effective planning, financing, and implementation of agricultural development policies. The gap in agricultural data in these contexts may lead to sub-optimal policy design which, in the context of agriculture, may result in increased hunger and poverty. The 50x2030 Initiative to Close the Agricultural Data Gap addresses these problems with the goal of promoting evidence-informed decision-making to achieve Sustainable Development Goal 2 – Zero Hunger – among partner countries. Embedded in the Initiative, through its emphasis on capacity building and country partner ownership, is a significant contribution to SDG Indicator 17.18, which aims to "enhance capacity-building support to developing countries, including for least developed countries and small island developing States, to increase significantly the availability of high-quality, timely and reliable data…"[1]

To close the agricultural data gap, the 50x2030 Initiative supports a flexible survey system which (i) facilitates computing SDG, Comprehensive Africa Agriculture Development Programme (CAADP), and national priority indicators, (ii) monitors annual agricultural production, (iii) provides data for official agricultural statistics, (iv) collects conjunctural as well as annual data for policy-making, and (v) provides the data needed to understand agricultural productivity and income. The system builds on the experience of the FAO's Agricultural Integrated Surveys Programme (AGRIS) and the World Bank's Living Standards Measurement Study - Integrated Surveys on Agriculture (LSMS-ISA) programs and, just like those programs, will be an integral part of national statistical systems.

The 50x2030 Initiative survey system is a modular, integrated program, whereby key agricultural data, namely production, is collected on an annual basis, while more in-depth agricultural data is collected every three years with the aim of not only monitoring but *understanding* agricultural systems. Under the integrated survey program, household data is collected alongside agricultural data, allowing for analysis of the linkages between agricultural activities and multiple aspects of household (and individual-level) welfare. The 50x2030 survey tools take into consideration the lessons learned through the methodological research programs of the Global Strategy to Improve Agricultural and Rural Statistics (GSARS) and the LSMS-ISA program. The tools put forth by the Initiative will continue to evolve as necessary to account for methodological findings of the 50x2030 Methods and Tool Development component. The main features of the survey system are explained in more detail in the forthcoming *50x2030 Technical Paper Series #1*, which focuses on the overarching goals and objectives of the 50x2030 Initiative as well as its overall approach.

The objective of this document is to describe the survey instruments, including the topics covered, the implementation strategy, and potential areas for country customization. This document is structured as follows: the remainder of Chapter I describes the measurement objectives and design principles underlying the development of the 50x2030 questionnaire instruments, the make-up of the survey system and the two survey programs offered (the Agricultural Survey Program and the Integrated Agricultural and Rural Survey Program), and key considerations for the implementation of the survey system; Chapters II and III describe the agricultural Core and Income, Labor, and Productivity (ILP) questionnaires in detail, respectively; Chapter IV describes the questionnaire tools designed specifically for minor agricultural seasons; Chapter V provides guidance on the adaptation of the Core and ILP questionnaires for various agricultural calendars and survey visit structures; Chapter VI describes the Non-Farm Income and Living Standards (ILS) household questionnaire instrument;

[1] For a complete list of Indicators under SDG 17, see: https://sustainabledevelopment.un.org/sdg17

Chapters VII – IX describe the rotating instruments on specialized agricultural topics, including Production Methods and Environment (PME-AG) and Machinery, Equipment, and Assets (MEA-AG).

A. 50x2030 Measurement Objectives and Design Principles

The aim of the 50x2030 Initiative is to strengthen national data systems so that they are better equipped to meet the data demands coming from global, regional, and national data reporting systems and obligations. In particular, countries adopting the 50x2030 survey approach will be well-positioned to produce official statistics with sound methodology and report on critical agricultural-related SDG indicators, as well as understand the drivers of agricultural productivity and income and their linkages with welfare and rural development. The approach integrates the collection of data on the basic features of the agricultural sector (including annual production figures) with a broader set of data on economic, environmental, and social factors of relevance to rural areas.

In particular, the 50x2030 initiative focuses on SDG 2 (Zero Hunger) and 5 (Gender Equality), and data collection for the computation of four high-priority SDG indicators:

- 2.3.1 – Volume of production per labor unit by classes of farming/pastoral/forestry enterprise size;
- 2.3.2 – Average income of small-scale food producers, by sex and indigenous status;
- 2.4.1 – Proportion of agricultural area under productive and sustainable agriculture;
- 5.a.1 – (a) Proportion of total agricultural population with ownership or secure rights over agricultural land, by sex; (b) Share of women among owners or rights-bearers of agricultural land, by type of tenure.

The survey instruments promoted through the 50x2030 Initiative also address several CAADP indicators, including 2.4, 3.1i, 3.1ii, 3.1vi, 3.2i, 3.2ii, 3.2iii, and 4.1i, and can be adapted and expanded to include national priority indicators as well as additional SDG indicators.[2]

The value of the data collected through the 50x2030 survey system extends beyond indicator computation and monitoring. The multi-topic, integrated nature of the survey system, particularly in years in which both the household and agricultural instruments are administered, fills gaps in agricultural data systems by linking them directly with data on household livelihoods and living standards more broadly. Integrating agricultural and household surveys not only benefits from economies of scale, but there are significant analytical advantages in agricultural practices and outcomes with household demographics, income, and various aspects of well-being.

The questionnaires making up the 50x2030 survey system are also designed to produce sex-disaggregated data that are crucial for understanding gender dynamics and women's engagement in a country's agricultural sector. These include land rights (captured in SDG indicators 5.a.1 and 1.4.2) [3]; ownership of major asset categories; access to and use of financial resources; participation in agricultural advisory services, training, and producer groups; intra-household decision making over agricultural production; and labor participation.

The questionnaire design process considered both data quality and cost-effectiveness, aiming to achieve a set of instruments that results in accurate measurement while maintaining feasibility of implementation. Over the past two decades, methodological research has delivered critical insights into survey design and established best practices for the measurement of agricultural outcomes. Through a series of methodological studies aimed specifically at comparing various methods for measuring key agricultural data, including subjective farmer-estimations, new technologies, and long-time gold standards, the implications of survey design on agricultural statistics have become clear. We are now better placed to optimize survey design for high-quality data

[2] Appendix I provides detail on the SDG indicators and CAADP indicators covered, as well as a description of the CAADP monitoring system.

[3] If the sampling universe is appropriate, the survey can produce the related SDG 1.4.2 Indicator - Proportion of total adult population with secure tenure rights to land, with legally recognized documentation and who perceive their rights to land as secure, by sex and by type of tenure.

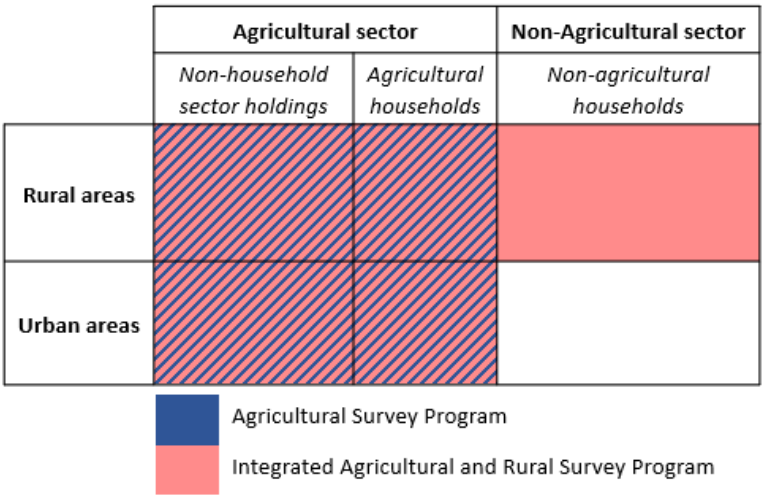
collection, using advanced technologies. For example, farmer self-reported estimates of agricultural land area are subject to severe and systematic error (Carletto et al., 2013, 2015, 2017), whereas GPS-based land area measurement provides an unbiased alternative, which is cheaper than traditional compass-and-rope methods. Other insights concern self-reported harvest quantities, recall periods and the unit of analysis, and soil quality, among others (Gourlay et al., 2019; Gourlay et al., 2017; Desiere and Joliffe 2018). Experience of the World Bank and the FAO in using computer-assisted personal interviewing (CAPI) for improved data quality and supervision, such as through the World Bank's Survey Solution program, will be scaled-up to 50x2030 operations whenever possible.[4] The 50x2030 survey instruments take these insights into account while being mindful of cost and capacity considerations to ensure that partner countries can collect reliable, high-quality agricultural data at a reasonable cost.

The questionnaire design process also drew on the work of the Global Strategy to Improve Agricultural and Rural Statistics (GSARS) and the FAO World Census of Agriculture program. Many of the concepts and definitions of the agriculture-related variables included in the questionnaires, as well as derived variables and indicators, can be found in the AGRIS Handbook (GSARS, 2017) and/or in the World Programme for the Census of Agriculture 2020 (FAO, 2015).

B. The 50x2030 Survey System

The survey program supported by the 50x2030 Initiative may take two forms depending on the country data collection needs and context: the Agricultural Survey Program (Agricultural Program) and the Integrated Agricultural and Rural Survey Program (Integrated Program).

FIGURE 1. COVERAGE OF THE AGRICULTURAL PROGRAM AND THE INTEGRATED PROGRAM IN 50X2030



The 50x2030 Agricultural Survey Program is a modular survey system with an annual core survey tool focused on crop, livestock, aquaculture, fishery, and forestry production ('CORE-AG'), and a set of specialized tools covering such topics as costs and farm income; labour and productivity; gender decision-making in agriculture; production practices and environmental aspects of farming ('ILP-AG', 'ILS-HH', 'PME-AG', 'MEA-AG'; illustrated in

[4] All reference questionnaires found in Appendix III will be made available on the Survey Solutions platform, with open access, by June 2020.

FIGURE 2). THESE SPECIALIZED TOOLS ARE ADMINISTERED AT LOWER FREQUENCIES (

Table 1). Additional specialized instruments may be added according to country needs and demand. An example of the sequence in which the survey tools may be administered is presented in

Figure 2, though this may be altered according to country needs.

The survey is sampled to be representative of the full agricultural sector, whether in rural or urban areas, covering both household and non-household farms, with the agricultural holding as the unit of analysis. Non-household farms receive a slightly altered version of the 50x2030 survey instruments, excluding the household component

FIGURE 2. SCHEMA OF THE 50X2030 AGRICULTURAL SURVEY PROGRAM

Years	1	2	3	4	5	6	7	8	9	10
Core Agricultural Module										
Farm Income, Labor, and Productivity										
Production Methods and Environment										
Machinery, Equipment, and Assets										

The 50x2030 Integrated Agricultural and Rural Survey Program follows the same logic as the Agricultural Program but integrates the agriculture tools with a household survey tool and broadens the target population to incorporate a sample of rural non-agricultural households into the system every three years (as illustrated in

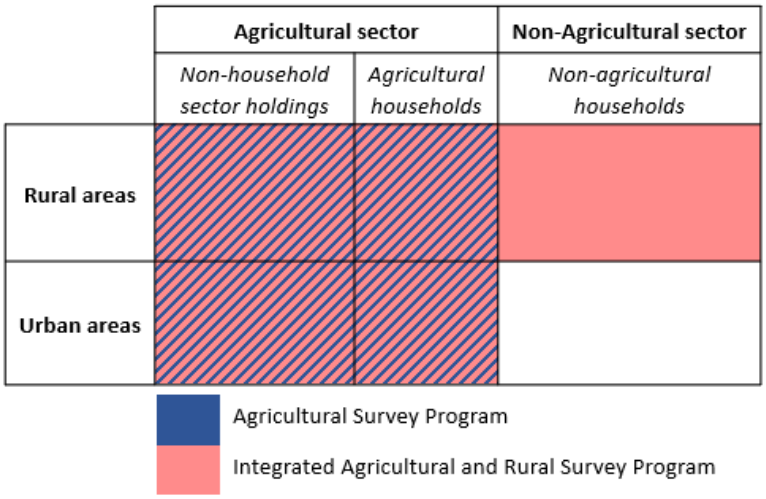
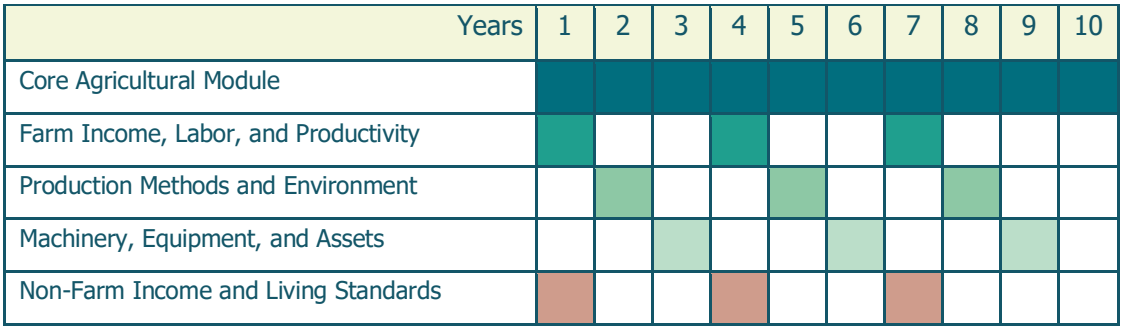


Figure 2). The Integrated model allows partner countries to better understand, on the one hand, the drivers and dynamics of rural development, structural transformation, and its linkages with agriculture; and on the other hand, the linkages between agricultural productivity and income with aspects of welfare and livelihoods, such as educational outcomes, non-agricultural income, or shocks and coping. The Integrated model achieves this through the combination of the Farm Income, Labor, and Productivity (ILP-AG) questionnaire and the Non-Farm Income and Living Standards Household (ILS-HH) questionnaire, which are administered together every three years (Figure 3). The model can be customized according to partner country needs, for example, to include consumption modules to measure poverty.

FIGURE 3. SCHEMA OF THE 50X2030 INTEGRATED AGRICULTURAL AND RURAL SURVEY PROGRAM



The 50x2030 Initiative's survey system with its two programs – the Agricultural Program and the Integrated Program – is composed of a package of tools (summarized in

Table 1). The specialized agricultural tools – ILP-AG, PME, and MEA – are integrated seamlessly with the CORE-AG tool. Therefore, agricultural production is captured in the same way annually, with different extensions added every year. Additional specialized tools may be developed by the Initiative or together with countries.

TABLE 1. TOOLS OF THE 50X2030 AGRICULTURAL PROGRAM AND INTEGRATED PROGRAM

Survey Tool	Content	SDG Indicator	Recommended Frequency	Target population	50x2030 Survey Program
CORE-AG	Crops, livestock, aquaculture, fisheries, forestry production		Annual	Agricultural households and agricultural holdings in the non-household sector	Both Agricultural Program and Integrated Program
ILP-AG	Agricultural income, agricultural labor, and productivity; land tenure, gender decision-making	2.3.1 2.3.2 5.a.1 1.4.2*	Every 3 years	Agricultural households and agricultural holdings in the non-household sector	Both Agricultural Program and Integrated Program
ILS-HH	Household member socio-demographics, education, off-farm labor and time-use, housing, non-agricultural income, shocks and coping	5.a.1 1.4.2*	Every 3 years	Agricultural and non-agricultural households	ILS-HH only in Integrated Program**
PME	Production Methods and Environment; Agricultural Sustainability	2.4.1	Every 3 years***	Agricultural households and agricultural holdings in the non-household sector	Both Agricultural Program and Integrated Program
MEA	Assets, Machinery, Equipment		Every 3-5 years	Agricultural households and agricultural holdings in the non-household sector	Both Agricultural Program and Integrated Program

* The ILP-AG covers all items needed to measure SGD 1.4.2; however, to properly compute the indicator, a nationally representative sample of households would be needed, which the 50x2030 system does not require.
** SDG 1.4.2 and 5.a.1 are measured through the ILS-HH in the Integrated Agricultural and Rural Survey Model. They are measured through the ILP-AG in the Agricultural Model.
*** The PME tool includes data collection for SDG Indicator 2.4.1, which is recommended to be measured every three years. Questions that do not pertain to Indicator 2.4.1 may be administered every six years, allowing for a lighter PME questionnaire in years which only 2.4.1 is measured.

Core Agricultural Questionnaire (CORE-AG): The CORE-AG questionnaire is administered annually to agricultural households and holdings in the non-household sector. It captures the major components of agricultural production (crop, livestock, aquaculture, fishery, and forestry production), generating timely estimates of agricultural output.[5] For the household sector, the CORE-AG questionnaire contains a limited set of demographic information (gender, age, marital status, and education of household members). Chapter II covers the CORE-AG in detail.

Farm Income, Labor, and Productivity Questionnaire (ILP-AG): The Farm Income, Labor, and Productivity Questionnaire (ILP-AG) is administered every three years to agricultural households as well as holdings in the non-household sector. In addition to the set of production questions included in the CORE-AG questionnaire, it covers five key topics for the 50x2030 Initiative: land tenure; agricultural production costs; agricultural income; labor; and gender differentials in decision-making, productivity, and management. As such, the ILP-AG is used to compute SDG indicators 5.a.1 (*a. Proportion of total agricultural population with ownership or secure rights over agricultural land, by sex; b. Share of women among owners or rights-bearers of agricultural land, by type of tenure*)[6], 2.3.1 (*Volume of production per labor unit by classes of farming / pastoral / forestry enterprise size),* and 2.3.2 (*Average income of small-scale food producers, by sex and indigenous status*). Beyond these indicators, the ILP-AG questionnaire solicits information that will help countries to understand the drivers of agricultural productivity and income, and how these relate to gender dynamics in the agricultural sector. Chapter III describes the ILP-AG in detail.

Non-Farm Income and Living Standards Household Questionnaire (ILS-HH): The Non-Farm Income and Living Standards (ILS-HH) questionnaire is a light, multi-topic household questionnaire capturing information on the household and its members, including education, labor and time use, housing conditions, shocks and coping, household enterprises, and other household income. As part of the Integrated Agricultural and Rural Survey Program (Integrated Program), it is administered in full to agricultural households and to non-agricultural households in rural areas every three years (

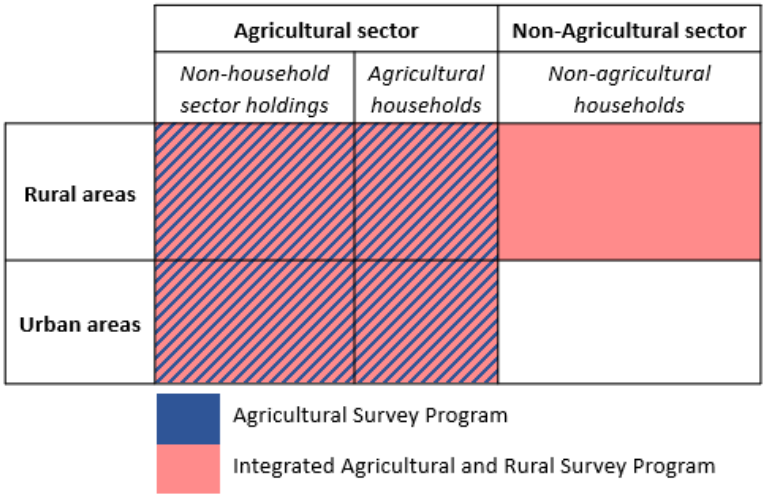


Figure 3). The ILS-HH and the ILP-AG are designed to be administered together following the LSMS-ISA model. The ILS-HH questionnaire, especially when it is integrated with the ILP-AG questionnaire, facilitates an in-depth assessment of the linkages between and dynamics of agriculture and rural development. The generic ILS-HH questionnaire presented in this document is considerably shorter than a standard multi-topic household survey questionnaire. This allows partner countries to customize and add further modules according to specific preferences. The ILS-HH questionnaire is not part of the Agricultural Survey Model (

Figure 2). Chapter VI covers the ILS-HH in detail.

[5] The possibility to derive production estimates relevant for the livestock, aquaculture, fishery and forestry sectors depends on the sample characteristics.

[6] In the Integrated Program, land tenure is asked in the I-HH questionnaire. Refer to Chapter III for more details.

PME-AG: The Production Methods and Environment tool focuses on agricultural production methods and their environmental, social, and economic sustainability, as well as agricultural investments, marketing and storage. It is administered every three years to agricultural holdings in the household sector (agricultural households) and in the non-household sector. The PME tool includes all information required to compute SDG indicator 2.4.1 *(Proportion of agricultural area under productive and sustainable agriculture).* Chapter VII describes the PME tool in detail.

MEA-AG: The MEA instrument captures information about the use of assets, machinery, and equipment in the agricultural sector. It is recommended to be administered every three-to-five years (depending on rate of mechanization) to holdings in the household and non-household sectors. Although this instrument is currently under development, Chapter VIII provides a general description of the content.

C. Implementation of the 50x2030 Survey Programs

While the contents of the generic 50x2030 agricultural, household, and rotating questionnaires are discussed in detail in the ensuing sections, this section provides an overview of some of the practical challenges in implementing the surveys, and how to address them.

Number and timing of field visits

The 50x2030 Initiative foresees the implementation of the survey organized in two visits per household/farm during the agricultural year: one visit shortly after the crop planting period of the main agricultural season (*post-planting visit*) and another one after crop harvest has been completed (*post-harvest visit*). The baseline version of the annual CORE-AG (and ILP-AG and PME) questionnaire presented in this document is therefore split accordingly into a post-planting instrument, which gathers information on agricultural land and crops planted (see Chapter II.A), and a post-harvest instrument, which focusses on seasonal crop harvest and harvest use (see Chapter II.B). Agricultural activities somewhat less affected by seasonality, or whose seasonality is very different than that of temporary crops, such as permanent crop production, livestock, aquaculture, forestry, and fisheries, are covered in the post-harvest visit with reference to 12 months, the entire agricultural year (Chapter II.C).

The 50x2030 Initiative survey system is designed to cover the entire agricultural year. Of course, agricultural seasonality varies greatly across the globe. Some countries may have two cropping seasons of equal importance or many short seasons. In such cases, the questionnaires need to be adjusted, and the questionnaire design allows for this flexibility. For cases in which there exists a minor agricultural season, a separate instrument has been designed to capture any seasonal crop production that the farm may have undertaken in the minor agricultural season (or off-season; Chapter IV).

The number and timing of field visits to collect data is an important choice in survey implementation, particularly when interest is in agricultural production activities. Many farming tasks, especially those related to temporary, seasonal crop production, such as plot preparation, input application, harvest and selling, take place over several months of each season. Many household farms in lower and lower-middle-income countries do not regularly keep records. When data collection takes place in just one visit to each farm per year, farmers are asked to recall the details of events sometimes many months in the past. Research has shown that such long recall periods can lead to bias (Arthi et al., 2018; Beegle et al., 2012; Kilic et al., 2018; Gaddis et al., 2019; Wollburg et al., 2020). However, splitting data collection up in many visits over the year is expensive and logistically challenging, and can have its own data quality implications (e.g. Schündeln, 2018). Chapter V discusses a wide range of different scenarios of seasons and numbers of visits and provides guidance on how to make the appropriate adjustments, while still gathering the same information.

The household sector and the non-household sector

The 50x2030 Initiative survey system delivers insights into partner countries' entire agricultural sector, and so the sample is made up of agricultural holdings of both the household sector (agricultural households) and the

non-household sector (e.g. farms operated by corporations). Demarcating holdings in the household sector from those in the non-household sector is not always straight-forward with definitions varying by country especially for the cases of high-tech or highly profitable farms run on household premises by household members. For this latter type of farms, the 50x2030 Initiative adopts registration as a simple and clear demarcating criterion. Holdings registered in a country's national business registry or business farmer organizations' registries (e.g. organizations of producers of milk, poultry) are thus considered to be part of the non-household sector in addition to farms operated by other entities like government structures, non-profit organizations and cooperatives. Accordingly, business registries and other lists of farms belonging to entities above mentioned (formal or informal) will form the basis of the sampling frame for non-household holdings. Holdings from the household sector will be covered through a sample of agricultural households derived from population and housing censuses, agricultural censuses or from household listing within selected Enumeration Areas (more details in the 50x2030 Sampling Documentation).

Households and holdings

There are two units of analysis of interest for the 50x2030 Initiative supported survey system. First, the agricultural holding as defined in the World Programme for the Census of Agriculture (WCA 2020) is as an:

> *… economic unit of agricultural production under single management comprising all livestock kept and all land used wholly or partly for agricultural production purposes, without regard to title, legal form or size. Single management may be exercised by an individual or household, jointly by two or more individuals or households, by a clan or tribe, or by a juridical person such as a corporation, cooperative or government agency. The holding's land may consist of one or more parcels, located in one or more separate areas or in one or more territorial or administrative divisions, providing the parcels share the same production means, such as labour, farm buildings, machinery or draught animals (FAO, 2015, p 43).*

The second unit of interest is the household. In the household sector of lower and lower-middle-income countries, one agricultural holding is most often operated by one household (FAO, 2015) and the 50x2030 sampling strategy relies on the household-based population census frame to draw a representative sample of holdings in the household sector. To allow for cases where one holding is operated by more than one household, a set of filter questions at the beginning of the agricultural survey instruments determines shared ownership and enquires about profit sharing from the jointly owned agricultural holding.

In the household-sector, instances in which one household operates more than one holding are rare. Acknowledging the rarity of this situation and the complexity of treating the holdings present in the household as separate entities, the 50x2030 survey instruments collect the information as if the holdings were a unique entity.

In the non-household sector, sampling is based on a list of agricultural holdings directly, and no socio-economic, household-level information on the holders and their households will be collected, making the mapping between holding and households obsolete in this case.

Respondent Selection

A key challenge in survey design is the selection of survey respondents. Research has shown that who responds to the questionnaire has implications for the accuracy of the data collected, in various domains relevant to the 50x2030 surveys.[7] Regarding agricultural variables, the preferred respondent is the most informed person on a given piece of land or agricultural topic, commonly the agricultural holder or co-holder, potentially while in the presence of a hired manager, or the manager of individual agricultural plots. . Concerning labor, the use of proxy respondents has an effect on male labor force participation (Bardasi et al., 2011), child labor measurement (Dammert and Galdo, 2013; Janzen, 2018), and labor inputs in agriculture seem to depend on whether the

[7] For a review of the literature, see Doss et al. (2017).

respondent is male or female (Palacios-Lopez et al., 2017). Similarly, for measuring asset ownership, relying on proxy respondents can lead to mismeasurement especially of female asset (physical, financial, land) ownership (Jacobs and Kes, 2015; Kilic and Moylan, 2016; Twyman et al., 2015).

These findings highlight the importance of careful respondent selection. While there are no unchallenged 'gold-standards' for respondent selection, it is important to understand who can provide the most accurate information on each topic of interest and to reduce the reliance on proxy respondents as much as possible, being mindful of the cost and logistical implications of interviewing several individuals. For instance, in light of the empirical evidence, the most thorough and reliable way to measure land ownership for SDG 5.a.1. (*(a) Proportion of total agricultural population with ownership or secure rights over agricultural land, by sex; (b) Share of women among owners or rights-bearers of agricultural land, by type of tenure*) as well as for other types of assets seems to be to interview all adult household members individually about their assets. This approach may to be too resource-intensive for most 50x2030 surveys. Nonetheless, seeing survey respondents' poor estimations of other household members' employment, income, and assets, it seems highly likely that responding about a plot they do not themselves manage will lead to inaccurate information. The 50x2030 survey tools therefore highly encourage respondents to be plot managers where applicable and require recording who provided information for each plot to assess data reliability.

In the household sector, respondent selection recommendations for the 50x2030 survey tools vary by module and section, depending primarily on the level of data collection (household, plot, individual, etc.), as summarized in Table 2.

In the non-household sector, the respondent selection process is different and depends on the holding organization. Generally speaking, if the holding does not have managers, the holder is expected to be the best respondent and s/he should consult collaborators or registers as needed; if the holding has managers, these may have more direct information than the holder and should be involved in the interview. See enumerator manuals for more details.

Customizing the survey system

THE 50X2030 INITIATIVE SURVEY SYSTEM IS DESIGNED IN A FLEXIBLE WAY, BASED ON A SET OF BEST-PRACTICE SURVEY INSTRUMENTS THAT SERVE AS ITS BUILDING BLOCKS. THIS APPROACH LENDS ITSELF TO CUSTOMIZATION BASED ON COUNTRY NEEDS AND DEMANDS. FOR EXAMPLE, SOME COUNTRIES MAY BE INTERESTED IN GATHERING INFORMATION ON AGRICULTURAL INCOME, LABOR, AND PRODUCTIVITY, WHICH IS COVERED IN THE ILP-AG QUESTIONNAIRE, MORE THAN EVERY THREE YEARS. WHILE CUSTOMIZATION IS A FEATURE OF THE 50X2030 INITIATIVE SURVEY SYSTEM, THE INITIATIVE RECOMMENDS ADMINISTERING CERTAIN TOOLS OF THE SYSTEM AT LEAST AS FREQUENTLY AS LISTED IN

Table 1 above.

TABLE 2. RESPONDENT SELECTION

Agriculture questionnaires		
Modules/topics	**Level of observation**	**Recommended respondent**
Introductory sections; parcel and plot listing	Household/holding	most knowledgeable household member regarding farm operations; may be assisted by other farm managers and laborers within the household
Plot details; crop production	Plot-level/plot-crop-level	Plot manager

Crop seeds; crop disposition / destination	Crop-level	Most knowledgeable member regarding harvest and disposition, by crop
Input use and acquisition	Household/holding	Most knowledgeable household member regarding farm operations
Crop production labor inputs	Individual	Individual respondents recommended; most knowledgeable household member regarding farm operations
Livestock raising and production sections	Livestock or livestock type	Manager/caretaker for each livestock type (large ruminants, small ruminants, etc.)
Processed crop products; Other livestock products; forestry production; fishery production; aquaculture production	Product type	Most knowledgeable household member regarding farm / livestock / aquaculture / forestry / fishery operations
External labor; livestock, fisheries, aquaculture, forestry labor	Worker category	Most knowledgeable household member regarding farm / livestock / aquaculture / forestry / fishery operations
Household questionnaire (ILS-HH)		
Modules/topics	**Level of observation**	**Recommended respondent**
Member roster; Housing; Other Income; Shocks and Coping;	Household	Primarily head of household; may be assisted by other informed adults within the household. In the absence head of household, most-informed adult member of the household to be selected as the respondent
Education; Labor and Time Use; Access to Finance;	Individual	Individuals age 10 years and older[1] should respond for themselves. Guardians/caretakers must answer on behalf of children age 5 to 9 years
Household enterprises	Household enterprise	Manager(s) of the household enterprise(s)
Food	Household	Individual primarily responsible for the preparation of food, with the assistance of others ~~preparing food~~.
Assets Ownership	Asset type	Head of household, who should be assisted by other informed adults within the household

[1] to be customized at country-level

II. The Core Agricultural Questionnaire (CORE-AG)

The CORE-AG questionnaire is the key instrument of the 50x2030 survey system. It is administered annually and covers the following topics: crop planting, production, and destination (temporary and permanent crops); agricultural parcel and plot area and use; input use (seeds and fertilizers, chemicals, etc.); livestock production; aquaculture, fishery, and forestry production; land use and labor use of the holding (Table 3). The questionnaire is organized in a set of *sections*, each of which covers a topic or one part of a topic (e.g. for the topic 'livestock', one section covers livestock ownership and another covers livestock products).

TABLE 3. TOPICS COVERED IN THE CORE-AG QUESTIONNAIRE

Post-Planting Visit	
Topics covered	*Reference period*
Parcel and plot area and use	Agricultural season
Crops planted	Agricultural season
Seed and Plant Use and Acquisition	Agricultural season
Land Use	Agricultural season
Post-Harvest Visit	
Topics covered	*Reference period*
Temporary Crop Production and Destinations	Agricultural season
Inputs for Crop Activities (fertilizers, chemicals)	Agricultural season
Permanent Crop Production and Destinations	12 months
Livestock production: Poultry Others	 3 months 12 months
Aquaculture, Fishery and Forestry Production	12 months
Labor	12 months

The 50x2030 Initiative strongly recommends two data collection visits, one post-planting visit and one post-harvest visit relative to the main agricultural season. The reference CORE-AG instrument presented in this section is structured accordingly: one set of topics is covered in the post-planting visit (Parcel and plot area and use; Crops planted; Seed and Plant Use and Acquisition; Land Use) and the other set of topics is covered in the post-harvest visit (Temporary Crop Production and Destinations; Inputs for Crop Activities; Permanent Crop Production and Destinations; Livestock production; Aquaculture, Fishery and Forestry Production; Labor). Given that countries often have more than one agricultural season, and recognizing the need to cover the entire agricultural year, Chapter V below discusses in detail how to adapt the reference questionnaires for different seasonal patterns.

Each topic is covered using the reference period most suitable for the time horizon of the agricultural activity to which it relates. Specifically, for activities related to the production of temporary crops, the reference period is the agricultural season. For activities related to the production of permanent crops, livestock, aquaculture, forestry, and fisheries, the reference period is the past 12 months, which coincides with the agricultural year.

A. Post-Planting Visit Sections

The sections administered in the post-planting visit refer to crop production post-planting activities. Table 4 below provides an overview of all post-planting sections and the topics these cover. The following subsections discuss each section in detail.

TABLE 4. CORE-AG SECTIONS ADMINISTERED IN THE POST-PLANTING VISIT

Topics and Questionnaire Sections	Level of Data Collection	Reference period
Introduction		
0A Interview Cover	Household	
0B Identification of the Holding	Household	
0C Roster and Education of Household Members	Household	
0D Agricultural Activities	Household	
Parcel and plot area and use		
1 Agricultural Parcel Roster and Details	Parcel	Agricultural season
2 Plot Roster and Details	Parcel-Plot	Agricultural season
Crops planted		
3 Crop Roster	Parcel-Plot	Agricultural season
Seed and Plant Use and Acquisition		
4 Seed and Plant Use and Acquisition	Crop	Agricultural season
Land Use		
5 Land Use	Holding	Time of interview

Introduction

The Introduction is composed of four sections:

- 0A Interview Cover
- 0B Identification of the Holding
- 0C Roster and Education of Household Members
- 0D Agricultural Activities

The information solicited (or pre-filled) in Section **0A Interview Cover** is country specific. However, this section aims to ensure that the enumerator approaches the household providing the necessary information on the survey. In addition, it contains filter questions on engagement in agricultural activities.

Section **0B Holding Identification** helps to identify cases in which the holding is run jointly by co-holders that belong to different households.

Section **0C Roster of Household Members and Education** collects basic demographic and educational information on the household members. In addition, it identifies the household member/s that have the legal and economic responsibilities on the agricultural activities (i.e., holding) of the household (i.e. holder/joint-holders) as well as household members who take the day-to-day decisions on the agricultural activities (manager/s).

Finally, Section **0D Agricultural Activities** provides an overview of the main usual agricultural activities of the household.

Parcel and plot area and use

Section 1. Agricultural Parcel Roster and Details

The Agricultural Parcel Roster records all the parcels[8] entirely or partially used for crop production in the reference agricultural season. This section, together with the following section, Plot Roster, has several critical functions. It introduces the parcel and plot as the key units of observation for crop production activities, which is considered to improve respondent recall. It may not always be feasible to measure all parcels, for instance, if

[8] A parcel is defined as a piece of land of one tenure type entirely surrounded by other land, water, roads, forests of a different tenure type that may or may not be used or owned by the same household.

parcels are very far away or very large. Criteria for which parcels may be excluded from measurement should be established at the country-level.[9]

The section also records how farmers have acquired each of their parcels and whether a system of irrigation is in place.

Section 2. Plot Roster and Details

This section records all the plots[10] within the parcels devoted to crop production. As before, both farmer-reported and GPS-measured areas are collected for each plot. This improves the respondent recall and allows for reliable measurement of area planted and more accurate yield estimates. An ample body of research has shown that farmer-reported land area estimates are severely biased. GPS-based land area measurement provides a cost-effective and unbiased alternative (Carletto et al. 2013, 2015, 2017). Instructions for GPS-based area measurement are included in Appendix II.

Further, the manager of each plot is recorded. It is recommended that the plot manager, who is likely most knowledgeable about cropping activities, be the respondent for the plot throughout the interview.

Combined with other sections, the information in this section assures an accurate estimation of the agricultural area utilized, crop areas, and yields. In addition, the section identifies the sex of the plot manager, allowing the analysis of gender differentials in land productivity.

Crops Planted

Section 3. Crop Roster

This section records all seasonal crops that were cultivated in the reference agricultural season and all tree/permanent crops planted at the time of the interview, for each plot on each parcel. This parcel-plot structure is critical since it guides respondents' recall and assures a more accurate crop listing than would result from a more simple crop listing. The section further gathers data on the percentage of plot area planted with a given crop – relevant for intercropping – as well as the month that a given crop was planted.

Seed and Plant Use and Acquisition

Section 4. Seed and Plant Use and Acquisition

Information on the application of seeds and plants is collected individually for each crop in Section 4 (Seed and Plant Use and Acquisition). The standard instrument presented in Appendix III does not break this information down further by plot and parcel. An extended version with a full crop-by-plot breakdown is discussed in Chapter III.D. This section collects information on the type of seeds applied (improved or traditional) and quantity. Questions vary slightly for temporary and permanent crops, as appropriate.

The information in this section is used to derive indicators on the quantity of seeds applied, seed intensity, and adoption of improved seeds (by crop), among others.

Land Use

Section 5. Land Use

This section gathers the data required to inform national-level statistics on land use. Questions focus on the use types that are not covered in the plot and crop roster – that is, land under temporary meadows and pastures, land under permanent meadows and pasture, farm buildings and farmyards, forests and other wooded lands, land used for aquaculture, and other lands. Answers are based on respondent declarations.

[9] Countries may want to limit the GPS measurement only to parcels within a certain distance from the interview location or may want to skip the measurement of parcels considered to be too large. Countries may also decide to perform GPS measurement on a subsample of parcels.

[10] A plot is defined as a continuous piece of land on which a specific crop or a mixture of crops is grown or which is fallow is waiting to be planted, under a uniform, consistent crop management system.

B. Post-Harvest Visit: Crop Production Sections

The sections in this part of the CORE-AG refer to post-harvest activities related to seasonal crops – that is, production and destination of temporary crops as well as input use. Table 5 provides an overview of the section and the respective topics these cover.

TABLE 5. CORE-AG CROP PRODUCTION SECTIONS ADMINISTERED IN THE POST-HARVEST VISIT

Topics and Questionnaire Sections	Level of Data Collection	Reference period
Introduction		
0A Interview Cover	Household	
Temporary Crop Production and Destination		
1A. Temporary Crop Production	Parcel-Plot-Crop	Agricultural season
1B. Temporary Crop Destination	Crop	Agricultural season
Inputs for Crop Production		
3C. Input Use and Acquisition	Household	Agricultural season

Introduction

The Introduction includes only Section 0A Interview Cover. The information solicited (or pre-filled) in this section is country specific. However, it aims to ensure a proper identification and selection of the main respondent.

Temporary Crop Production and Destination

Section 1A. Temporary Crop Production

The seasonal crops that farmers had declared to cultivate in the post-planting visit are entered in the post-harvest questionnaire in this section. This section records, by parcel-plot, the quantities of seasonal crops harvested during the reference agricultural season as well as expectations for the reference agricultural season (if harvest is not yet underway or is not yet completed). In addition, it collects data on harvest timing and pre-harvest losses.[11]

Information on temporary crop production is collected at the parcel-plot-crop level. The questionnaire allows reporting the actual and expected harvests in non-standard units of measurement and in different states and conditions. This has been shown to be critical to reducing reporting errors (Oseni et al., 2017), and it is particularly important in contexts where non-standard units are very common, and where a single crop may be harvested in different states. Note that the inclusion of non-standard units in the questionnaire requires that conversion factors are available or constructed for the units, in order to allow for reporting of production in a standard unit (i.e., kilograms).[12]

The information collected in this section is crucial to generate production estimates. In addition, it gathers information on pre-harvest losses. Combined with land area measured in the Plot Roster section, it is used for yield estimates (harvest per unit of land). The section also generates insights into gender dynamics, on the one

[11] An optional set of questions addressing losses due to disasters, in line with SDG Indicator 1.5.2, is being developed and will be part of the package of tools of the Initiative.

[12] Conversion factors, which allow the conversion of non-standard units to a common standard unit, are essential. If complete and reliable conversion factors do not already exist within the statistical system, a separate small-scale survey operation should be conducted in order to generate the conversion factors. Conversion factors may be needed for non-standard units of crop production, input use, and/or land area. Conversion factors for production units may be constructed through the implementation of a market survey, where the necessary crop-unit-condition combinations are weighed, and the standard measure recorded. For more detail on collecting conversion factors for non-standard units, see the guidelines set forth by Oseni et al. (2017).

hand by collecting information on who in the household exerts control over harvest use and, on the other hand, by linking production to plot manager information.

Section 1B. Temporary Crop Destination

The Temporary Crop Destination section records how farmers used their production of seasonal crops, differentiating between the following destinations/uses:

- Sold unprocessed
- Used for own consumption
- Given out to other households as gifts
- Used for wages or reimbursement of land, labor, or inputs
- Used for animal feed
- Processed
- Kept aside for seeds
- Storage
- Lost after harvest (post-harvest loss)

At the time of the interview, part of the harvest may be stored for future utilization. Therefore, the section collects the intended destination of stored harvest (in percentage terms). This detailed information on the purpose of harvest stored allows a more accurate estimate of household crop utilization, including consumption.

The value of unprocessed sales is one of the central items of any agricultural questionnaire and allows the calculation of the total value of sales and of the unit value for each crop. The latter is necessary in order to compute the value of all crop destination components and thus to calculate the total value of production.

The information is collected at the crop level. The questionnaire allows reporting the quantities in non-standard units of measurement and in different states and conditions.

Inputs for Crop Production

The section on Input Use and Acquisition (Section 3C) gathers information on the application of fertilizers and chemicals. The CORE-AG questionnaire collects only fertilizers and chemical inputs. Labor inputs are collected in detail in the ILP-AG questionnaire every three years.

Data is disaggregated by type of input. A more detailed approach, disaggregating input use by plot of land, which allows for a more meaningful understanding of agricultural productivity, is presented in Chapter IV.

Alongside the section on seeds, this section serves to generate indicators on the quantity of inputs applied and input intensity.

C. Post-Harvest Visit: 12-Month Recall Sections

The sections included here are to be administered at the end of the agricultural year, which is typically during the post-harvest visit of the main season, with a reference period of 12 months. However, to reduce recall biases, some specific questions are administered with a reference period less than 12 months.[13] Table 6 below presents the section and corresponding levels of data collection of the 12-month reference periods.

TABLE 6. CORE-AG YEARLY RECALL SECTIONS ADMINISTERED IN THE POST-HARVEST VISIT

Topics and Questionnaire Sections	Level of Data Collection	Reference period
Permanent Crop Production and Destination		
2A. Tree & Permanent Crop Production	Parcel-Plot-Crop	12 months

[13] For instance, the egg production section adopts a 3-month reference period and includes questions that allow for annualization.

2B. Tree & Permanent Crop Destination	Crop	12 months
Livestock production		
4A. Livestock - Ownership	Livestock Type	12 months
4B. Livestock – Change in Stock (Ruminants)	Livestock Type	12 months
4C. Livestock – Change in Stock (Poultry)	Livestock Type	3 months
4G. Livestock – Milk Production	Livestock Type	12 months
4H. Livestock – Egg Production	Livestock Type	3 months
4I. Livestock – Other Livestock Products	Product Type	12 months
Aquaculture, Fishery and Forestry		
5A. Aquaculture Production	Product Type	12 months
6A. Fishery Production	Product Type	12 months
7A. Forestry Production	Product	12 months
9. Labor (Household & External, Holding level)	Worker category	12 months

Permanent Crop Production and Destination

Section 2A. Tree & Permanent Crop Production

The list of trees/permanent crops farmers reported to be cultivating in the post-planting visit transcribed from the post-planting questionnaire to the Tree/Permanent Crop Production section of the post-harvest questionnaire.

This section collects information on the quantities of tree and permanent crops cultivated and harvested during the last 12 months. The 12-month reference period is appropriate as tree and permanent crops typically do not have a specific production period, or at least not one that lines up with the more narrowly defined seasonality of temporary crops. In addition, the section collects data on the total number of each type of plant and/or tree per plot, the year in which the majority of these plants/trees were planted, and the number of plants/trees in production in the last 12 months. The section also allows for the estimation of pre-harvest losses, as well as the dates of the production period of each permanent crop.

The section is administered following temporary crop harvest and harvest destinations given the similarity of the harvest and harvest destinations sections for permanent and temporary crops.

The information is collected at the parcel-plot-crop level. The questionnaire allows reporting the actual and expected harvests in local units of measurement and in different states and conditions.

This section is used to generate production estimates for the last 12 months, by crop. It is combined with land area to estimate yields. The section also generates insights into gender dynamics, on the one hand by collecting information on who in the household exerts control over harvest use, and, on the other hand, by linking production to plot manager information.

Section 2B. Tree & Permanent Crop Destination

This section records how farmers used their production of seasonal crops, differentiating between the following destinations/uses:

- Sold unprocessed
- Realized consumption
- Given out to other households as gifts
- Used for wages or reimbursement of land, labor, or inputs
- Used for animal feed
- Kept aside for seeds
- Kept in storage
- Lost after harvest (post-harvest loss)

At the time of the interview, part of the harvest may be stored for future utilization. The section collects the intended destination of stored harvest (in percentage terms). This detailed information on the purpose of stored harvest allows a more accurate estimate of household crop utilization, including consumption.

The value of unprocessed sales is one of the central items of any agricultural questionnaire and allows the calculation of the total value of sales and of the unit value for each crop. The latter is necessary to value the crop quantities used for all destination components listed above and thus to calculate the total value of production.

The information is collected at the crop level. The questionnaire allows reporting the quantities in local units of measurement and in different states and conditions.

Livestock

Section 4A. Livestock - Ownership

This section covers the stock of animals presently kept by the household/on the holding. Questions are on the number of animals raised by the holding, the number of animals owned by the holding but raised by other holdings, and control, within the household, over revenues from livestock. Information is collected at livestock type level (e.g. cows, swine, chickens).

Section 4B. Livestock – Change in Stock (large and medium-sized ruminants)

This section collects detailed information on the change in the number of animals for large and small ruminants in the past 12 months, distinguishing all entries (births, purchases, gifts received, etc.) and exits (sales, deaths, losses, slaughtering, donations, etc.). Quantities of meat produced, consumed and sold are also collected. Information is collected at livestock type level.

Section 4C. Livestock – Change in Stock (Poultry)

The same information as in the previous section is collected for poultry over a three-month recall period. The three-month recall period is considered best practice for poultry due to the shorter reproductive cycles of these animals (Zezza et al., 2017). To cover the entire year, the values collected in this section need to be multiplied by four, assuming relative stability across poultry lifecycles. Information is collected at livestock type level (e.g. chicken, duck).

Section 4G. Livestock – Milk Production

This section covers production, consumption, and sales (quantities and values) of the milk collected by the holding. All questions are administered at livestock type level, where applicable.

Section 4H. Livestock – Egg Production

This section captures quantities of eggs laid by poultry. Egg consumption (quantities) and sales (quantities and values) are also collected.

Section 4I. Livestock – Other Livestock Products

This last section on livestock collects production and sales of other various livestock products including cheese, butter, yogurt, honey, shorn wool, pulled wool, non-carded animal hair, silkworm cocoons, furs, animal skins and hides, animal dung, and animal power. Information is collected at product type level.

Aquaculture, Fishery, and Forestry

The CORE-AG questionnaire collects basic information on aquaculture, fishery, and forestry production. Labor inputs to this production activity are captured in the ILP-AG instrument.

Section 5A. Aquaculture Production

This section collects information on the amount and value of the aquaculture production. Aquaculture products are simply distinguished in three main categories (fish, crustaceans, and clams/mollusks) and the information refers to the past 12 months.

Section 6A. Fishery Production

This section collects information on the amount and value of fishery production. Fishery products are simply distinguished in three main categories (fish, crustaceans, and clams/mollusks) with the idea that a detailed list of fish species be developed at the country level. The information refers to the past 12 months. However, due to the irregularity of fishing activities – in absence of production records - the total production is annualized combining detailed records on the last fishing experience and the frequency of the activity.

Section 7A. Forestry Production

This section collects information about the amount and value of forestry production. It suggests a list of products distinguishing between wood-based products and non wood-based products (including plants and animals). Such lists shall be further refined and adapted at the country level.[14] The information refers to the past 12 months.

Section 9. Labor (Household & External, Holding level)

The CORE-AG does not include detailed sections on labor, as labor input data expressed in terms of time are not needed on annual basis. However, recognizing the value of having basic information on labor, the CORE-AG includes a light section on labor.

The section records which worker category has been engaged on the various activities of the holding and simply collects the total number of individuals employed. Information is collected separately for three main worker categories: household members (age/sex disaggregated), free/exchange laborers, and hired workers (further disaggregated by permanent, temporary, and casual).

D. Administering the CORE-AG to the Non-Household Sector

Considering definitions adopted in the 50x2030 survey methodology, agricultural holdings of the non-household sector will be in general either modern or well organized (institutional farms) or market-oriented (agricultural corporations/quasi-corporations). These farms will likely be keeping records or have managers that have quite accurate knowledge of key information. Therefore, common measurement error and recall issues faced in the household-sector will be much less important in this context.

The following considerations were made in the framework of the adaptation of questionnaires for the non-household sector:

(i). The 50x2030 Initiative adopted an integrated farm and household survey model. For holdings in the non-household sector, household-related questions will not be administered. Instead, agricultural information is collected about the *holding* and questions have been rephrased to reflect that.

(ii). As mentioned above, recall issues are expected to be less prominent in the non-household sector. Accordingly:
   a. Some questions or groups of questions were reviewed and simplified (see details below)
   b. Only a one-visit implementation scenario was considered: the working questionnaires are the combined post-planting and post-harvest questionnaires (CORE-AG and ILP-AG versions).

(iii). Objective measurement of production (crop-cutting) and area (GPS measurement) are not considered for holdings in the non-household sector given the assumption of minimal recall issues and accurate knowledge of farm managers.

Table 7 below shows the main changes made in the adaptation of the survey instruments for the non-households.

[14] Wood-based products are considered the primary products for the forestry sector and official forestry statistics focus only on wood-based products. List and definitions of primary products can be found at: http://www.fao.org/forestry/7800-0aded052ed8904ee31f045d5a3f79ae1d.pdf and http://www.fao.org/forestry/32128-01b084a6978a458aef11d09006fa25042.pdf
However, some countries may decide to expand the data collection to non wood-based products (Sorrenti, 2017).

TABLE 7. SUMMARY OF ADAPTATIONS OF CORE-AG QUESTIONNAIRE FOR NON-HOUSEHOLD SECTOR

Topics/Sections	Changes
All	Household-related questions were removed
Labor Input - Household	Section removed
Labor Input - External	▪ Questions on payment of hired workers asked per various units of time and not only per day ▪ Exchange labor removed
Change in stock-poultry	12 months recall adopted
Livestock labor	Household labor and unpaid workers removed
Milk production	Quantity of milk produced by livestock type, asked directly for the past 12 months
Egg production	Quantity of eggs laid by poultry type, asked directly for the past 12 months
Aquaculture labor	Household labor and unpaid workers removed
Fishery production	Only questions administered to households keeping records were considered
Fishery labor	Household labor and unpaid workers removed
Forestry labor	Household labor and unpaid workers removed

III. Farm Income, Labor, and Productivity Questionnaire (ILP-AG)

The Farm Income, Labor, and Productivity Questionnaire (ILP-AG) builds on the CORE-AG questionnaire and is administered every three years (see Figure 3). The CORE-AG and the ILP-AG share a set of core questions focusing mainly on production. This way, production figures are comparable every year. Beyond production, the ILP-AG covers several areas of special interest to the 50x2030 Initiative: costs for agricultural production, agricultural income (including SDG 2.3.2); labor inputs (needed for SDG 2.3.1); land tenure (including SDG 5.a.1); gender dynamics in agriculture; drivers of agricultural productivity.

In the Integrated Agricultural and Rural Survey model supported by the 50x2030 Initiative, the ILP-AG is administered alongside the Non-Farm Income and Living Standards Household Questionnaire (ILS-HH), a combination which allows insights into the linkages between agricultural productivity and income and aspects of welfare and livelihoods. This section explains in detail how the ILP-AG goes beyond sections covered in the CORE-AG (Table 8). Like the CORE-AG, the reference ILP-AG questionnaire is designed for two visits.

TABLE 8. COMPARISON OF TOPICS IN ILP-AG AND CORE-AG

Post-Planting Visit	
Topics	*ILP-AG vs. CORE-AG coverage*
Parcel and Plot Area and Use	• ILP-AG includes basic information on production practices
Crops planted	• no difference
Seed and Plant Use and Acquisition	• ILP-AG covers also quantities purchased and costs related to inputs
Land Use	• no difference
Post-Harvest Visit	
Topics	*ILP-AG vs. CORE-AG coverage*
Temporary Crop Production and Destinations	• no difference
Inputs for Crop Activities	• ILP-AG covers labor input to crop production

	• ILP-AG covers also quantities purchased and costs related to agricultural inputs
Permanent Crop Production and Destinations	• no difference
Crop Processing	• Only in ILP-AG
Livestock Production	• ILP-AG expands on gender aspects • ILP-AG includes costs related to raising livestock • ILP-AG includes livestock labor input
Aquaculture, Fishery and Forestry	• ILP-AG covers labor input to production
Other Costs	• Only in ILP-AG

A. ILP-AG Post-Planting Visit Sections

The sections administered in the post-planting visit refer to crop production post-planting activities. Table 9 below provides an overview of all post-planting sections and the topics these cover. The following subsections discuss each section in detail.

TABLE 9. ILP-AG SECTIONS ADMINISTERED IN THE POST-PLANTING VISIT

Topics and Questionnaire Sections	Level of Data Collection	ILP-AG vs. CORE-AG Coverage
Introduction		
Parcel and plot area and use		
1 Agricultural Parcel Roster and Details	Parcel	Expanded
2 Plot Roster and Details	Parcel-Plot	Expanded
Crops planted		
3 Crop Roster	Parcel-Plot	Identical
Seed and Plant Use and Acquisition		
4 Seed Use and Acquisition	Crop	Expanded
Land Use		
5 Land Use	Holding	Identical

The Farm Income, Labor, and Productivity Questionnaire contains only Section **0B Identification of the Holding** and **0D Agricultural Activities**, whose content is identical to the CORE-AG explained above. 0A Interview Cover and the information captured in 0B Roster and Education of Household Members are covered in the ILS-HH questionnaire, therefore they are not repeated here.

Section 1. Agricultural Parcel Roster and Details

In the ILP-AG, this section covers the same questions as in the CORE-AG. The parcel-plot structure is introduced in this section as the key unit of observation for crop production activities.

In addition, the ILP-AG collects more detailed information on the following:

- In the ILP-AG questionnaire, the parcels used for cultivation are fed forward from the household questionnaire to this section.
- In addition to creating the list of parcels used for crop production, the section elicits essential information on soil, erosion, and irrigation. This information is of interest in understanding how these factors affect agricultural productivity and income.

In the *Integrated Agricultural and Rural Survey Program,* the full parcel roster is collected in the ILS-HH questionnaire in order to allow for the collection of land tenure data on all parcels, not only those which are utilized for agriculture. This parcel roster (Section 12 of the ILS-HH questionnaire) collects data on *all* parcels of land which a household member owns, uses, or holds use rights to, regardless of the use of the parcel. The parcels that are used for agricultural purposes are then fed forward to Section 1 of the ILP-AG questionnaire.

This is done automatically through the use of a CAPI application, such as the Survey Solutions application provided, or manually if using paper-based implementation.

Land tenure security is an important factor in understanding household wealth, intra-household land ownership, and determinants of agricultural productivity. The importance of land tenure has been recognized in the SDG agenda, resulting in the inclusion of several indicators aimed at measuring land tenure rights and systems. Two key SDG indicators on land tenure security that rely on household survey data are:

> **SDG Indicator 1.4.2 --** proportion of total adult population with secure tenure rights to land, with (a) legally recognized documentation; and (b) who perceive their rights to land as secure, by sex and by type of tenure.
>
> **SDG Indicator 5.a.1 –** (a) proportion of total agricultural population with ownership or secure rights over agricultural land by sex; and (b) share of women among owners or rights bearers of agricultural land, by type of tenure.

Depending on the sampling strategy employed, Section 12 of the ILS-HH questionnaire, may be used for monitoring both Indicators 1.4.2 and 5.a.1. If a nationally representative household sample including both urban and rural areas is utilized, the data collected through the parcel roster is sufficient for measuring both Indicators 1.4.2 and 5.a.1. If the sample of the survey program is not representative of all urban and rural households, the data collected through this section can still be used to monitor indicator 5.a.1 and may contribute to the monitoring of indicator 1.4.2. For a detailed description on the methodology and data needs of Indicators 1.4.2 and 5.a.1, refer to the guidance document prepared by FAO, the World Bank, and UN Habitat (2019).

If implementing the *Agricultural Survey Program,* the parcel roster (Section 12 of ILS-HH) should be moved into the ILP-AG questionnaire and limited to ask only about agricultural parcels.

Section 2. Plot Roster and Details

The ILP-AG covers the same questions as the CORE-AG. In addition, the ILP-AG elicits limited information on land preparation techniques as well as the duration of the fallow periods. This information is of interest in understanding how these factors affect agricultural productivity and income.

As in the CORE-AG, the plot manager is listed in this section. This is of particular importance for the objectives of the ILP-AG questionnaire: it allows for a meaningful assessment of gender dynamics in agriculture, by relating the gender of the plot manager to e.g. harvest, yield, quality and value of inputs.

Section 3. Crop Roster

This section is identical in CORE-AG and ILP-AG.

Section 4. Seed Use and Acquisition

This section appears in the ILP-AG and the CORE-AG. However, the ILP-AG questionnaire complements the annual data with the quantity and value of purchased seeds and main providers. Seed purchases are part of farmers' input costs and as such are critical components of agricultural income (needed for SDG 2.3.2). The Seeds and Plants Use and Acquisition section in the ILP-AG further facilitates productivity analysis.

Section 5. Land Use

This section is identical in CORE-AG and ILP-AG.

B. ILP-AG Post-Harvest Visit: Temporary Crop Production Sections

The sections in this part of the questionnaire refer to post-harvest activities related to seasonal crops – that is, production and destination of temporary crops as well as input use. Table 10 below provides an overview of the sections and the respective topics these cover, comparing ILP-AG and CORE-AG coverage.

TABLE 10. ILP-AG VS CORE-AG CROP PRODUCTION SECTIONS ADMINISTERED IN THE POST-HARVEST VISIT

Topics and Questionnaire Sections	Level of Data Collection	ILP-AG vs. CORE-AG Coverage
Introduction		
Temporary Crop Production and Destination		
1A. Temporary Crop Production	Parcel-Plot-Crop	Identical
1B. Temporary Crop Destination	Crop	Identical
Inputs for Crop Production		
3A. Labor Input by Household Members	Individual	Only in ILP-AG
3B. Labor Input (External Workers)	Worker Category	Only in ILP-AG
3C. Input Use and Acquisition	Household	Expanded

Temporary Crop Production and Destination

Section 1A. Temporary Crop Production

This section is identical in the ILP-AG and the CORE-AG.

Section 1B. Temporary Crop Destination

This section appears in the ILP-AG and the CORE-AG. However, the ILP-AG questionnaire complements the annual data with the quantity and value of purchased inputs. Such additional data inform the income and the productivity analysis and, combined with the sections on input use, allow the undertaking of a cost analysis of agricultural activities.

Inputs for Crop Production

On the topic of input use, the ILP-AG questionnaire collects information on labor as well as fertilizers and chemicals.

Section 3A. Labor Input by Household Members

The section on household labor input in the ILP-AG collects information on household members who have contributed to crop production in the reference agricultural season. It is part of the ILP-AG but not of the CORE-AG.

The information is collected at the individual level. For each household member, the enumerator records whether the person worked in household crop production as well as the number of days and hours worked in the reference agricultural season. In addition, the various work activities (e.g. planting, plot maintenance, harvesting) each household member was engaged in are recorded. The individual-level approach was chosen as it allows for the collection of relatively accurate information on time worked and avoids potential reporting errors commonly affecting aggregated figures. In addition, it allows exploring gender differentials in crop production participation.

The reference period is the agricultural season. However, the combination of sections as part of the post-harvest package of questionnaires covers the entire agricultural year.

Combined with labor input data collected in other sections (external labor input, livestock, aquaculture, forestry and fisheries labor), this section is critical to generating the denominator of the SDG indicator 2.3.1 *Productivity of small-scale food producers*, which focuses on the value of production per time unit of labor. Combined with other sections on input use, it allows undertaking a cost analysis.

This section on household member labor in crop production is somewhat more detailed than the sections on labor input into livestock, aquaculture, forestry, and fisheries activities because in many contexts in agriculture in lower and lower-middle-income countries, seasonal crop production dominates in terms of value added, time and resources spent.

Section 3B. Labor Input: External workers

This section gathers information on hired and free/exchange workers that contributed to the holding's crop production activities. It is part of the ILP-AG but not of the CORE-AG.

Given the impracticality of creating a roster of external workers, this section collects the information at the household level, disaggregated only by worker type: men (adults), women (adults), children hired workers and men (adults), women (adults), children free/exchange laborers. First, the respondent is prompted to record the number of workers in each category, then the number of days a typical worker from each category has been engaged in crop-related activities as well as the length of a typical working day. For hired workers, the section collects the daily pay rate.

The reference period is the agricultural season. However, the combination of sections in the post-harvest package allows covering of the entire agricultural year.

Combined with labor input data collected in other sections, this section is critical to generating the denominator of the SDG indicator 2.3.1 *Productivity of small-scale food producers*, the value of production per time unit of labor input. Hired labor is also a key component in the cost of production and, as such, contributes directly to income from agriculture also captured in SDG indicator 2.3.2.

Section 3C. Input Use and Acquisition

This section appears in the ILP-AG and the CORE-AG. However, the ILP-AG questionnaire complements the annual data with the quantity and value of purchased inputs. Such additional data inform the income and the productivity analysis and, combined with other sections on input use, allow the undertaking of a cost analysis of agricultural activities.

C. ILP-AG Post-Harvest visit: 12-Month Recall Sections

This section details the sections intended to be administered at the end of the agricultural year, which is typically during the post-harvest visit of the main agricultural season, with a reference period of 12 months. However, to reduce recall biases, some specific questions are administered with a recall period of less than 12 months.[15]. Table 11 below gives an overview of the coverage of the ILP-AG relative to the CORE-AG questionnaire.

TABLE 11. ILP-AG YEARLY RECALL SECTIONS ADMINISTERED IN THE POST-HARVEST VISIT

Topics and Questionnaire Sections	Level of Data Collection	ILP-AG vs. CORE-AG coverage
Permanent Crop Production and Destination		
2A. Tree & Permanent Crop Production	Parcel-Plot-Crop	Identical
2B. Tree & Permanent Crop Destination	Crop	Identical
3D. Plant Acquisition	Crop	ILP-AG only
Processed Crop Production		
2C. Crop Processing	Processed product	ILP-AG only
Livestock Production		
4A. Livestock - Ownership	Livestock Type	Extended
4B. Livestock – Change in Stock (Ruminants)	Livestock Type	Identical
4C. Livestock – Change in Stock (Poultry)	Livestock Type	Identical
4D. Livestock – Breed, Housing, Feed	Livestock Category	ILP-AG only
4E. Livestock – Labor	Worker Category	ILP-AG only
4F. Livestock - Health	Livestock Category	ILP-AG only
4G. Livestock – Milk Production	Livestock Type	Identical
4H. Livestock – Egg Production	Livestock Type	Identical
4I. Livestock – Other Livestock Products	Product Type	Identical

[15] For instance, the egg production section adopts a 3-month reference period and includes questions that allow the annualization.

Aquaculture, Fishery and Forestry		
5A. Aquaculture Production	Product Type	Identical
5B. Aquaculture Labor	Worker Category	ILP-AG only
6A. Fishery Production	Product Type	Identical
6B. Fishery Labor	Worker Category	ILP-AG only
7A. Forestry Production	Product	Identical
7B. Forestry Labor	Worker Category	ILP-AG only
Other costs		
Other Costs	Cost Type	ILP-AG only

Permanent Crop Production and Destination, Processed Crop Production

Section 2A. Tree/Permanent Crop Production

This section is identical in the ILP-AG and the CORE-AG.

Section 2B. Tree/Permanent Crop Destination

This section is identical in the ILP-AG and the CORE-AG. In the Integrated and Rural Survey Program, revenues from crop production are used for the calculation of the total household income.

Section 2C. Crop Processing

This section collects information on on-farm processing of commodities produced by the holding. The section includes a detailed list of processed products that are to be adapted at the country level. The section gathers information on the quantity of production and value of sales of each product in the past 12 months, as well as who in the household controls the earnings derived from this activity.

Section 3D. Plant Acquisition

This section captures the costs related to planting permanent crops using a 12-month reference period.

Livestock

Section 4A. Livestock - Ownership

Compared to the CORE-AG, the ILP-AG expands on gender aspects of livestock management and ownership.

Section 4B. Livestock – Change in Stock (large and medium-sized ruminants)

This section is identical in the ILP-AG and the CORE-AG.

Section 4C. Livestock – Change in Stock (Poultry)

This section is identical in the ILP-AG and the CORE-AG.

Section 4D. Livestock – Breed, Housing, Feed

This section does not appear in the CORE-AG. It is included only in the ILP-AG. It collects information on expenses related to livestock raising, specifically breeding, housing, watering, and feeding of livestock at the livestock category level (e.g. large ruminants, small ruminants, chickens). This information is part of the cost of animal agriculture production and a component of household income from agriculture as reflected in SGD 2.3.2.

Section 4E. Livestock – Labor

This section does not appear in the CORE-AG, it is included only in the ILP-AG. It collects information on labor input for livestock-related activities. Time spent working on rearing animals or on production of livestock products is captured for the following worker type categories: household members (further disaggregated in men, women, and children), free/exchange workers, and hired workers. Value of pay to hired workers is also collected, which is a cost component used in computing household income.

Combined with labor input data in other sections, this section is used to generate the denominator of the SDG indicator 2.3.1 *Productivity of small-scale food producers*, on the value of production per time unit of labor.

Section 4F. Livestock – Health

This section does not appear in the CORE-AG; rather, it is included only in the ILP-AG. It covers costs related to animal health: vaccination, treatment against internal and external diseases, and curative treatments. Information is collected at livestock category level. This information is part of the cost of animal agriculture production and a component of household income from agriculture as reflected in SGD 2.3.2.

Section 4G. Livestock – Milk Production

This section is identical in the ILP-AG and the CORE-AG.

Section 4H. Livestock – Egg Production

This section is identical in the ILP-AG and the CORE-AG.

Section 4I. Livestock – Other Livestock Products

This section is identical in the ILP-AG and the CORE-AG.

Aquaculture, Fishery and Forestry

Both ILP-AG and CORE-AG gather information on aquaculture, fishery, and forestry production. Labor inputs to this production activity are captured only in the ILP-AG.

Section 5A. Aquaculture Production

This section is identical in the ILP-AG and the CORE-AG.

Section 5B. Aquaculture Labor

This section does not appear in the CORE-AG, it is included only in the ILP-AG. Labor input (expressed as time and cost) is collected separately for three main worker categories: household members (age/sex disaggregated), free/exchange laborers and hired workers.

Combined with labor input data in other sections, the information collected in this section is used to generate the denominator of the SDG indicator 2.3.1 *Productivity of small-scale food producers*, which focuses on the value of production per time unit of labor.

Value of pay to hired workers is also collected, which is a cost component used in costing agricultural production and in computing household income.

Section 6A. Fishery Production

This section is identical in the ILP-AG and the CORE-AG.

Section 6B. Fishery Labor

This section does not appear in the CORE-AG, it is included only in the ILP-AG. Labor input (expressed as time and cost) is collected separately for three main worker categories: household members (age/sex disaggregated), free/exchange laborers and hired workers.

Combined with labor input data in other sections, this section contributes to generate the denominator of SDG indicator 2.3.1 *Productivity of small-scale food producers*, which focuses on the value of production per time unit of labor.

Value of pay to hired workers is also collected, which is a cost component used in costing agricultural production and in computing household income as reflected in SDG 2.3.2.

Section 7A. Forestry Production

This section is identical in the ILP-AG and the CORE-AG.

Section 7B. Forestry Labor

This section does not appear in the CORE-AG, it is included only in the ILP-AG. Labor input (expressed as time and cost) is collected for three main worker categories: household members (age/sex disaggregated), free/exchange laborers and hired workers.

Combined with labor input data in other sections, this section contributes to generating the denominator of the SDG indicator 2.3.1 *Productivity of small-scale food producers*, which focuses on the value of production per time unit of labor.

Value of pay to hired workers is also collected, which is a cost component used in costing agricultural production and in computing agricultural income as reflected in SDG 2.3.2.

Section 8. Other Costs

This section does not appear in the CORE-AG, it is included only in the ILP-AG. It records all the relevant agricultural costs that are not otherwise captured in the other sections, including:

- Animal traction rental
- Post-harvest labor
- Transportation
- Rental or leasing of machinery, equipment, and vehicles
- Repairs and maintenance of machinery, equipment, and vehicles
- Fuel and lubricants
- Rental or leasing of farm buildings
- Repairs and maintenance of farm buildings
- Agricultural insurance
- Agricultural advisory services
- Water (including irrigation fees)
- Contractual services for agricultural activities
- Other

Combined with other sections, this section is necessary in order to undertake a cost analysis of agricultural production and to calculate agricultural income (SDG 2.3.2).

IV. CORE-AG and ILP-AG: Optional Expansions

This chapter discusses several extensions to the baseline reference ILP-AG questionnaire. First, a more disaggregated, in-depth set of sections for agricultural inputs (crop and livestock labor; fertilizers, chemicals). Second, a crop cutting section and protocol to complement farmer-reported harvest estimates. These two extensions are designed to improve data quality and its analytical value.

A. Measurement of agricultural inputs

The reference ILP-AG questionnaire was designed to strike a balance between implementation feasibility, costs, and data quality. To reduce interview time and offer a simple solution, the sections on crop labor inputs, seeds, fertilizer and chemicals, and livestock labor inputs were aggregated to the individual, crop, item, and worker-type level, respectively. However, this has its drawbacks in terms of analytical utility of the data and data quality. On the latter, evidence shows that high levels of aggregation in data collection can sometimes lead to issues in data quality (e.g. Oseni et al., 2017; Abay et al., 2019).[16] On the former, having labor and input data at the crop level allows for a full-fledged productivity analysis at the plot level, and retains information on the heterogeneity of farmers' decisions on the use of the inputs and allocation of labor across different plots. An empirical investigation into plot-level variation of input application (fertilizer) based on data from the Malawi IHS4 2016/17 survey, the Mali EAC I 2017 survey, and the Tanzania NPS 2012/13 survey, revealed meaningful

[16] The link between levels of aggregation and labor and input data quality has not been explored in detail through methodological research. The 50x2030 Initiative may provide this kind of research to provide firm guidelines on the data quality-aggregation trade-off in labor and inputs.

variation of application rates and quantities across plots with the same crops and with different crops.[17] This variation is missed when not reporting at the plot level. Further, capturing plot-to-plot heterogeneity in labor and agricultural inputs improves the quality of gender analysis, allowing the study of variation in input access and use by gender of the plot manager.

The following extended sections are offered in Appendix III:

Seed and Plant Use and Acquisition / Crop Roster (Extended)

The adjustments required to collect seed and plant use at the plot level require moving a set of questions on whether the seeds used were improved varieties and how much seed was used from the crop-level Seed and Plant Use and Acquisition section to the plot-crop-level Crop Roster section. In this more detailed version, the information on type and quantity of seeds used will now be asked separately for each plot-crop.

Labor Input by Household Members (Extended)

The extended Labor Input by Household Members section contains the same questions as the standard section, but these questions are administered at the plot-level for each household member instead of at the household-level for each household member.

Labor Input by External Workers (Extended)

The extended Labor Input by External Workers section contains the same questions as the standard section, but these questions are administered at the plot-level rather than the holding-level.

Input Use (Extended) / Input Use and Acquisition

For the plot-level Input Use section, information on the quantity of input *used* is dropped from the standard Input Use and Acquisition section. Information on the quantity and type of input used is asked for organic fertilizer, inorganic fertilizer and herbicide/pesticide is gathered at the plot level in the detailed Input Use section.

Livestock – Labor (Extended)

The reference livestock labor section presented in this document collects livestock labor information at the worker-type level (household members by gender and age; hired and exchange workers). The extended version collects this information by livestock group, acknowledging that different livestock groups (large ruminants, small ruminants, poultry) require different labor inputs.

B. Crop cutting

There is robust empirical evidence on the, often systematic, measurement error in farmer-reported harvest estimates. For example, Gourlay et al. (2019) and Desiere and Jolliffe (2018) report on various potential sources of such reporting errors, such as those due to measurement complications, either related to unintentional or intentional bias in reporting. The evidence suggests that the reporting error also seems to be related to the area of agricultural land. These errors can drive the estimates in productivity analysis (Desiere and Jolliffe, 2018; Gourlay et al., 2019), and bias the relationship between land and productivity in any direction leading to inconclusive results (Abay et al., 2019).

Crop cutting is a more objective measurement method for crop production. Since 1950, the FAO has considered crop cutting the gold standard for measuring crop production and yields. For the 50x2030 Initiative, crop cutting is proposed as an optional method to obtain a more accurate measure of the production of a country's main

[17] For instance, 62 percent of farms in Malawi apply organic fertilizer to some of their plots with the same crop but not to others, while 63 percent do in Tanzania, and 18 percent in Mali. Moreover, the mean absolute deviation at the farm level of kilograms of inorganic fertilizer per hectare (plot) planted with the same crop is 91.4 kg/hectare (13.8 kg/plot) for Malawi and 46.3 kg/hectare (14.1 kg/plot) for Tanzania.

crops. The adoption of this section is recommended when a more accurate measure of yields is required for statistical or research purposes.

In general terms, crop cutting entails harvesting randomly located subplots within one or more plots that are cultivated with a specified crop or crops and to weigh the harvest before and after drying.

Crop cutting allows the estimate of the quantity of production of an entire plot based on randomly selected subsections of plots. The quantity harvested from this small subsection is used in combination with the total area of the plot to estimate total production.

Despite being considered the gold standard, crop cutting has its own pitfalls and can lead to estimates with measurement error (Desiere and Jolliffe, 2018). Possible reasons for inaccurate crop cutting measures are discussed in Gourlay et al. (2019). To be successful, crop cutting needs to be well implemented and carefully supervised.

The most reliable estimates are obtained by performing crop cutting on all plots of all households of the sample. While some countries have been implementing this method for many years, such as Ethiopia, it may not be feasible at scale given the high costs of crop cutting implementation and supervision. Rather, the crop cutting section may be administered to a subsample of households and/or plots.

Procedures and practices for crop cutting are discussed in FAO (2018b). Gourlay et al. (2019) and Kilic et al. (2018) are some successful examples of crop cutting experiments based on well-established and defined protocols.

Subsampling and questionnaire design

The sampling and questionnaire design of the crop-cutting tools are driven by specific decisions in terms of:

1. The specific crops selected for crop cutting;
2. Limitation of the exercise to plots in pure stand or inclusion of intercropped plots.
3. The selection of households or plots involved in the crop cutting.
4. Whether the size of the subplot is fixed or varies with the crop.
5. Whether the secondary crop grown on the plot is also harvested or just the primary.

Subsampling may be performed by (i) selecting a subsample of households or (ii) subsampling plots of each of sampled households for the crop cutting. The latter option is preferred in terms of the efficiency of final subsample of plots for producing reliable estimates of yields and productions. The size of the subsample can be determined by the budget available or calculated using estimates of yield variation using secondary data. Desktop selection of the households' subsample is feasible but for plots/crops a systematic selection or a simple random subsampling in the field, using a table of random numbers, would be more operational, as a listing of all plots and crops is required.

The sampling strategy for crop cutting is described in the 50x2030 Sampling Strategy and Documentation.

The inclusion of the crop cutting section may have implications for the design of the ILP-AG or CORE-AG questionnaire. For instance, it might require the collection of agricultural and labor inputs at the plot level to be able to reconcile the yields with the other production factors. That is, it is recommended to use the plot-level sections mentioned above when implementing crop cutting activities.

Moreover, it will require households/holdings to be visited at least twice. Field teams visit the household once at post-planting and once when the crop is mature, but before the plot is harvested (i.e. before the post-harvest visit). During the first visit, the enumerator will proceed with the demarcation of the area of the crop cutting subplot. During the second visit, the enumerator will guide the harvest of the crop. The crop will be weighed first at the time of harvest and each of the subplots will be weighed separately. During the same visit, the subplot

harvest or a portion of it will be identified for drying. Once the crop is thoroughly dried, the crop will be weighed again.

The harvesting time may vary by crop; therefore, if the crop cutting is done on many plots and on many crops of the household/holding, the enumerator will have to visit during the harvest period of each plot/crop.

Questionnaire sections for the crop cutting are included in Appendix III. The sections were designed under the assumption that (i) the crop cutting is implemented for all or main crops in the country; (ii) both plots in a pure stand or intercropped are included; (iii) harvest is collected and weighed only for the main crop. However, the section can be easily adapted to the harvest and measurement of all crops in the subplot.

Crop cutting data is collected through two questionnaire sections:

Section 1 - Crop Cutting Subplots Detail

This section will guide the selection of the crop cutting subplot and the demarcation of the area. It is implemented at the time of Post Planting visits and collects information on the type of culture in the plot (pure stand vs intercropped); the size of the subplot and the coordinates of the subplot and the number of plants/pieces on the subplot. In this proposed section, the size of the subplot will vary according to the crop to be harvested.

Questions 4 to 9 are used for the crop cutting subplot selection. The suggested protocol follows Gourlay et al (2019) and implies the use of random tables and a compass to identify how far along the long side of the plot (starting from a random corner) and how much inside parallel to the short side the subplot should be located.

Section 2 - Crop Cutting

This section will be completed at the harvest time, when the subplots are harvested, and the crop is weighed, and comprise further information on the status of the plot at the time of harvest (harvest prior to crop cutting; density of the crop; losses and damages). The last two questions of the section refer to the weighing of the dried crop.

To avoid lack of accuracy in the crop cutting measurement field staff shall be trained on crop cutting procedures while the fieldwork should be supervised. Procedures and protocols are explained and discussed in FAO (2018b) and Gourlay et al. (2019).

IV. CORE-AG and ILP-AG tools for the minor agricultural season

The CORE-AG (and ILP-AG) questionnaire must capture production (and income) for the entire agricultural year, including for seasonal crops. However, in most real-world scenarios, the agricultural season spans less than 12 months and there may be two or more agricultural seasons in the agricultural year.

Implementing a post-planting and a post-harvest visit for two or more seasons (that is, four or more visits per year) is likely to significantly increase costs and may get very logistically challenging. However, in most countries, there is one dominant, major agricultural season in which farmers produce the bulk of temporary crops (and earn the bulk of income from temporary production), and one minor or off-season. The CORE-AG (and ILP-AG) questionnaire is therefore available as a shorter minor season version which covers key items, often in a more aggregated way to limit respondent burden.

The CORE-AG and ILP-AG minor season questionnaires are simplified versions of the post-planting and post-harvest crop production CORE-AG and ILP-AG instruments. The sections with 12-month reference periods already cover the entire year and do not need to be adjusted or repeated for the minor season.

Table 12 below provides an overview of the sections in the minor season ILP-AG and CORE-AG, indicating the level of data collection and their inclusion in the CORE-AG and ILP-AG.

TABLE 12. SECTIONS OF THE MINOR SEASON CORE-AG AND ILP-AG

Topic and Sections	Level of Data Collection	CORE-AG minor	ILP-AG minor
Parcel and plot area and use			
1. Agricultural parcel roster	Parcel	Yes	Yes
2. Plot Roster	Parcel-Plot	Yes	Yes
Crops planted			
3. Crop Roster	Parcel-Plot	Yes	Yes
Seed and Plant Acquisition			
4. Seed and Plant Acquisition	Crop	Yes	Yes
Temporary Crop Production and Destination			
5A. Temporary Crop Production	Parcel-Plot-Crop	Yes	Yes
5B. Temporary Crop Destination	Crop	Yes	Yes
Inputs to Crop Production			
6A. Labor Input (Household)	Individual	No	Yes
6B. Labor input (External)	Worker category	No	Yes
6C. Input Use & Acquisition	Input type	Yes	Yes

Section 1. Agricultural Parcel Roster

All the parcels entirely or partially used for crop production in the major agricultural season are copied from the major season instrument to this section and the respondent is prompted to make a parcel update to ensure that all the parcels used in the minor season are listed. Areas of the added parcels (if any) are recorded based on farmer declarations.

This section is identical in the minor season ILP-AG and the CORE-AG.

Section 2. Plot Roster

In this section, respondents are expected to list all the plots within the parcels devoted to crop production. Only farmer-declared areas are collected for each plot. GPS measurements would not be possible since the questionnaire is undertaken when the season is completed, and the plot configuration may have changed.

This section is identical in the minor season ILP-AG and the CORE-AG.

Section 3. Crop Roster

The Crop Roster records, by parcel-plot, all temporary crops that were cultivated in the minor agricultural season.

The parcel-plot structure of the section is designed to improve respondent recall. The resulting data are, therefore, at the parcel-plot-crop level.

In contrast to the major season sections, the minor season section Crop Roster does not ask if crops are under greenhouses or high/low shelters, as land use statistics are generated only based on the major season.

This section is identical in the ILP-AG and the CORE-AG.

Section 4. Seed and Plant Acquisition

Information on the application and acquisition of seeds and plants is collected by temporary crop. No breakdown by parcel or plot is proposed in the standard instrument. This section collects information on quantity of applied seeds.

This section is lighter than the corresponding major season section. For instance, it does not collect information on seed varieties or the main source of seeds.

The ILP-AG collects information on quantity of purchased seeds and their costs, while CORE-AG does not.

Section 5A. Temporary Crop Production

The temporary crops listed in the crop roster are fed forward to this section. It records the quantities of seasonal crops harvested.

This section is lighter than the corresponding section in the major season instrument. For instance, it does not include questions on the expectations of harvests and drops questions concerning the sex of the person managing the harvest.

This section is identical in the ILP-AG and the CORE-AG.

Section 5B. Temporary Crop Destination

This section records the destination of produced seasonal crops through the same channels as in the corresponding section in the major season instrument.

In contrast to the corresponding major season section, information on the sex of the person who controls crop earnings as well as on the intended destination of the stored harvest is not collected.

This section is identical in the ILP-AG and the CORE-AG.

Section 6A. Labor Input (Household)

This section does not appear in the minor season CORE-AG. It only appears in the minor season ILP-AG. It collects information on household members who have contributed to crop production in the minor agricultural season.

The information is collected at the individual level, following the same approach used by the corresponding major season section. However, in the minor season section, details on the type of work activities household members performed are not collected.

Section 6B. Labor Input (External)

This section does not appear in the minor season CORE-AG. It gathers information on hired and free/exchange workers that contributed to the crop production activities, following the same approach used by the corresponding major season section but without sex-disaggregation.

Section 6C. Input Use & Acquisition

This section collects information on the quantities of inputs applied. The data collected is disaggregated by type of input.

This section follows the same approach as the corresponding major season section. However, it does not collect information on the main source of the input.

This section appears in the ILP-AG and the CORE-AG. However, the ILP-AG questionnaire complements the annual data with the quantity and value of purchased inputs, given the need to generate costs for agricultural production and to compute agricultural income.

V. CORE-AG and ILP-AG adaptations for number of visits and agricultural calendars

As previously discussed, the reference CORE-AG (and ILP-AG) instrument presented in Chapter II was designed to be administered in one post-planting visit and one post-harvest visit relative to the main agricultural season. Then, Chapter IV presented a lighter version of the CORE-AG (and ILP-AG) instrument designed to be administered in one visit to cover the minor season. Hence, the reference CORE-AG instruments cater to an agricultural calendar with a major and minor agricultural season. This is quite common. Many countries have a main season and a minor/off-season in which fewer crops are cultivated and there is less reliance on agriculture. In some contexts, these seasons correspond to a long rainy season and a short rainy season, or a rainy season and a dry season. Countries may also have two or more seasons that are of equal importance to the economy and rural livelihoods. In order to collect data for the full agricultural year, the reference CORE-AG (and ILP-AG) questionnaire instruments are to be adapted to the specific scenario following the guidance provided below.

The agricultural calendar of a given context also has implications for fieldwork implementation. The number and timing of interview visits need to be carefully considered in light of the seasonal calendar. Evidence suggests that data quality may be inversely related to recall period, and, therefore, the timing of the interview visit(s) should be determined based on the main activities of interest. In most cases, this will translate to interviewing about production following the main agricultural season rather than the minor/off-season. The number of visits is also to be considered with respect to recall bias. The more interview visits, the shorter the recall period and respective recall bias. However, each visit is costly and requires dedicated staff time which may be difficult considering often over-burdened national statistical offices and line ministries.

Regardless of the number of agricultural seasons, the 50x30 Initiative recommends a two-visit approach, with visits timed according to the seasonal calendar. If budget constraints prohibit the implementation of a two-visit approach, a one-visit approach may be employed but this is to be considered a secondary option as there are data quality implications. The use of a one-visit approach renders the survey more prone to recall bias and prohibits the use of GPS-based plot area measurement, a method that has been shown to dramatically improve plot area measurement data (Carletto et al., 2013, 2015, 2017).

The CORE-AG instruments presented in this document so far fall into four different blocks according to their domains and reference periods:

1. *Seasonal crop production sections administered during the post-planting visit (discussed in Chapter II.A).*
2. *Seasonal crop production sections administered during the post-harvest visit (discussed in Chapter II.B).*
3. *12-month sections administered during post-harvest visit (discussed in section Chapter II.C).*
4. *The minor season version of the CORE-AG (discussed in Chapter IV).*

These four building blocks (Table 13) can be rearranged and combined to fit any number of visits and number of seasons and their relative importance for agricultural production and income.

The rest of this chapter provides guidance on how to arrange the CORE-AG and its data collection to the following three scenarios: (i) two-visit approach with two agricultural seasons; (ii) one-visit approach with one agricultural season; (iii) one-visit approach with two agricultural seasons. These three scenarios explain the most important cases and principles guiding the adaptation process, so that they can easily be applied to other, rarer scenarios not explicitly discussed here.

TABLE 13.DIFFERENT 'BLOCKS' OF SECTIONS OF THE CORE-AG INSTRUMENT

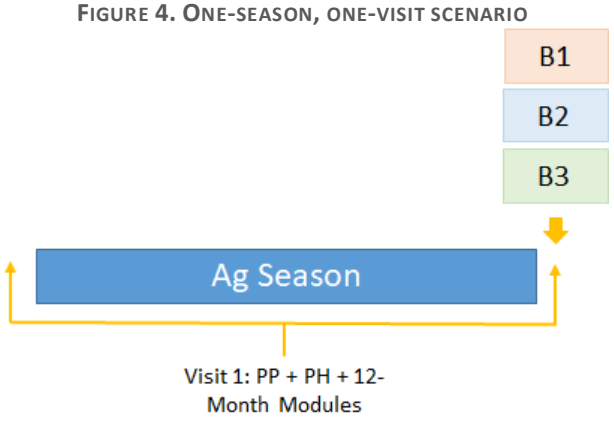
Block 1 (B1)		Block 2 (B2)		Block 3 (B3)		Block 4 (B4)	
Seasonal Post-Planting Sections		Seasonal Post-Harvest Sections		12 -Month Sections		Complete Minor Season Sections	
Topics	**Reference Period**	**Topics**	**Reference Period**	**Topics**	**Reference Period**	**Topics**	**Reference Period**
Parcel and plot area and use	Seasonal	Temporary Crop Production and Destinations	Seasonal	Permanent Crop Production and Destinations	12 months	Parcel and plot area and use	Seasonal
Crops planted	Seasonal	Inputs for Crop Activities	Seasonal	Crop Processing	12 months	Crops planted	Seasonal
Seed and Plant Use and Acquisition	Seasonal			Livestock	12 months	Seed and Plant Acquisition	Seasonal
Land Use				Aquaculture, Fishery and Forestry	12 months	Temporary Crop Production and Destination	Seasonal
				Other Costs	12 months	Inputs to Crop Production	Seasonal
				Labor	12 months		

A. One season, one visit

The survey design for a one-season, one-visit approach is illustrated in Figure 4. While it is unlikely that this scenario will be encountered in practice, it serves as a building block for scenarios in which a country has more than one season and where one interview visit is conducted per season.

In this scenario, the seasonal sections of the reference CORE-AG and ILP-AG questionnaires (blocks 1 and 2) are consolidated into a single instrument and administered in the post-harvest period of the agricultural season along with the 12-month sections (block 3). A complete instrument for the one-season, one-visit scenario is available in Appendix III.

FIGURE 4. ONE-SEASON, ONE-VISIT SCENARIO



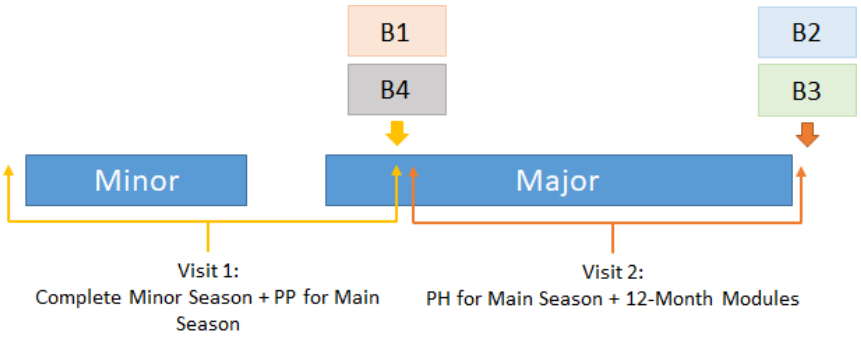
The disadvantages of using this model are (i) extended recall for seasonal post-planting activities, (ii) increased interviewing time, and (iii) the inability to implement GPS-based plot area measurement as this needs to be conducted in the post-planting stage for plot boundary identification. Benefits to using this model are limited to the reduced cost of fieldwork implementation, although it should be noted that the interviewing time during the one visit will be greater than if the interview were split over two visits.

B. Two seasons, two visits

The most likely scenario is one in which there are two agricultural seasons. These seasons may be composed of a major and minor season or two seasons of similar or equal importance. The determination of whether a season is major, minor, or equivalent is to be made on a country-by-country basis. Depending on the definition of the agricultural year in the country, it may be that the survey needs to be designed to capture a minor season that either precedes or follows the major agricultural season. Adaptations of the reference CORE-AG and ILP-AG questions for a two-visit approach for two agricultural seasons are illustrated below.

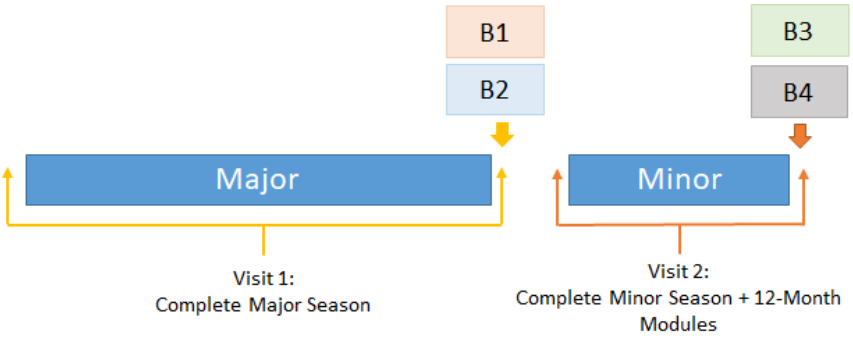
In cases where the **minor season precedes the major season,** the reference questionnaires should be adapted according to the illustration in Figure 5. In this scenario, recall bias for the major agricultural season is limited by maintaining the post-planting and post-harvest visits as in the reference questionnaire. However, the first visit also includes the administration of *block 4,* a set of sections designed for the minor season (available in Appendix III). These minor season sections are designed to collect the essential agricultural information at aggregated levels and do not capture the same level of detail as that of the major season. Therefore, caution should be taken in determining what constitutes a minor season. Within the first visit, the minor season sections, *block 4*, should be administered after the seasonal post-planting sections, *block 1.* The second visit is the same as that of the reference questionnaire, including the seasonal post-harvest and 12-month sections.

FIGURE 5. TWO-SEASON, TWO-VISIT SCENARIO WITH MINOR SEASON PRECEDING MAJOR SEASON



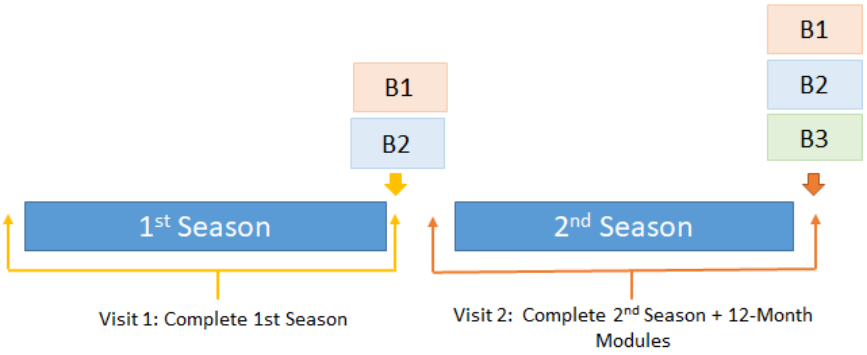
When the **major season precedes the minor season**, the feasibility of implementing separate post-planting and post-harvest visits is eliminated. Instead, it is necessary to conduct one visit per agricultural season as illustrated in Figure 6. The first visit comprises both seasonal blocks (1 and 2), to capture the seasonal agricultural activities of the major agricultural season. The second visit includes the 12-month sections (*block 3*) and the minor season sections (*block 4*, available in Appendix III). In this scenario, it is not possible to conduct plot-level GPS measurement.

FIGURE 6. TWO-SEASON, TWO-VISIT SCENARIO WITH MAJOR SEASON PRECEDING MINOR SEASON



If there are **two seasons of similar or equal importance,** it is not advised to use the minor season sections as they do not collect the same level of detail as the main season sections. At the same time, fielding a post-planting and a post-harvest visit in each season implies four visits. This is likely to inflate costs and can quickly become very logistically challenging. Rather, it is advised to implement the full set of seasonal sections for both seasons as seen in Figure 7. Similar to the scenario above, all seasonal sections for the first season are asked in the first visit, therefore combining the post-planting and post-harvest activities into a single visit. In the second visit, all seasonal sections (*blocks 1 and 2*) are asked for the second agricultural season followed by the 12-month sections (*block 3*). It is not possible to conduct plot-level GPS measurement in this scenario (though parcel-level GPS measurement is still required).

FIGURE 7. TWO-SEASON, TWO-VISIT SCENARIO WITH TWO SEASONS OF EQUAL IMPORTANCE



C. Two seasons, one visit

In contexts where there are two or more agricultural seasons, it is not recommended to implement a one-visit approach. However, if a two-visit approach is not feasible the following guidance can be used to inform the implementation of a one-visit approach. GPS-based plot-area measurement is not possible in any of the two-season, one-visit scenarios.

If there is **a major season and a minor season,** the full one-season, one-visit questionnaire instrument (as described in Chapter V.A and available in Appendix III) should be implemented in addition to the minor season sections (*block 4*). This is true regardless of whether the minor season precedes the major season (as in Figure 8) or the major season precedes the minor season (Figure 9). In both cases, the minor season sections should be asked after the administration of the seasonal sections for the main season.

FIGURE 8. TWO-SEASON, ONE-VISIT SCENARIO WITH MINOR SEASON PRECEDING MAJOR SEASON

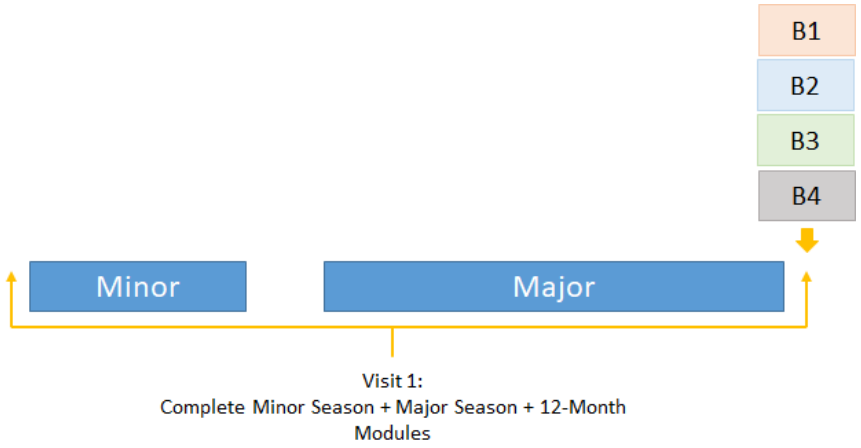


FIGURE 9. TWO-SEASON, ONE-VISIT SCENARIO WITH MAJOR SEASON PRECEDING MINOR SEASON

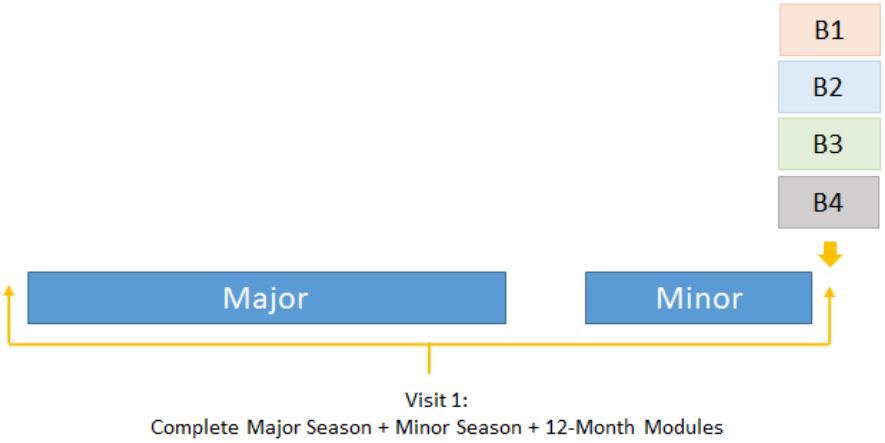


FIGURE 10. TWO-SEASON, ONE-VISIT SCENARIO WITH SEASONS OF EQUAL IMPORTANCE

If there are **two seasons of similar or equal importance,** it is not advisable to implement a one-visit approach as it will result in (i) recall bias and (ii) a heavy respondent burden. Figure 10 illustrates the manner in which the reference CORE-AG and ILP-AG questionnaires would be adapted to accommodate this scenario. The interview, which would be conducted after the harvest of the second season, would include the full set of season sections for both seasons plus the 12-month sections.

D. More scenarios

The scenarios, and questionnaire adaptations to them, discussed in this chapter can be used as a blueprint to adapt the CORE-AG (and ILP-AG) instruments to any agricultural calendar. For instance, if there are three seasons of equal importance for the main staple crops, there are several options: first, it is possible, though not particularly advisable, to follow the approach in Figure 10 and field blocks B1 and B2 for all three seasons. Another, better option would be to field three post-harvest visits, one at the end of each season. In some countries, it is the case that some parts of the country have a different seasonal pattern than others. For those cases, households may be administered a combination of the cases discussed which is tailored regionally.

VI. Non-Farm Income and Living Standards Household Questionnaire (ILS-HH)

The Non-Farm Income and Living Standards Household Questionnaire (ILS-HH) captures socio-economic information about agricultural and non-agricultural rural households and its members. The ILS-HH is a lean multi-topic household survey-type questionnaire covering education, labor and time use, housing conditions, shocks and coping, household enterprises, and other household income. In the 50x2030 Integrated Program (see Figure 3), the ILS-HH and the ILP-AG (section II) are administered together every three years. The ILS-HH questionnaire, especially when it is integrated with the ILP-AG questionnaire, facilitates an in-depth assessment of the linkages between and dynamics of agriculture and rural development, and is critical to understanding gender dynamics in the target population. It is expected that partner countries adapt the ILS-HH according to their priorities, and in line with household survey questionnaires that may already be in use. The generic ILS-HH questionnaire presented here does not include food and non-food consumption modules, which would be required to measure poverty, and countries may decide to add these modules. In the absence of consumption modules, information on food groups consumed, food insecurity experience, housing, education, and assets can be used for an indication or ranking of welfare, for example through such instruments as the Poverty Probability Index (PPI) or an asset index.

A few elements of the ILS-HH, gender, age, marital status, and education are part of the CORE-AG questionnaire.

In the recommended fieldwork arrangement with one post-planting and one post-harvest visit to field the ILP-AG questionnaire, the ILS-HH questionnaire can most easily be administered during the post-planting visit.

Table 14 summarizes the sections which make up the ILS-HH questionnaire. The questionnaire is printed in full in Appendix III.

TABLE 14. OVERVIEW OF ILS-HH SECTIONS

Questionnaire Section	Level of Observation	Content
1. Household Member Roster	Individual	Member listing, demographic information
2. Education	Individual	Member educational outcomes
3. Labor and time use	Individual	Employment, unemployment; wage work income; sex-disaggregated time use
4. Financial Access	Individual	Access to savings accounts and mobile money
5. Food Insecurity Experience Scale	Household	Perceptions of food insecurity, Food Insecurity Experience Scale (FIES)
6. Housing Conditions	Household	Dwelling characteristics, water, sanitation, cooking
7. Household Enterprises	Household	Non-agricultural enterprises
8. Other Income	Household	Income from other sources, transfers
9. Asset Ownership	Household/ individual	Sex-disaggregated ownership of household assets

10. Shocks and Coping Strategies	Household	Household shock exposure, impacts, and coping strategies
11. Food groups	Household	Food groups consumed by the household in the past 7 days
12. Land Tenure	Parcel	Land tenure questions corresponding to SDG indicators 5.a.1 and 1.4.2

A country-specific introduction should be included at the beginning of the ILS-HH. The introduction should ensure that the enumerator provides the household with the necessary information about the survey and includes the relevant regional and survey identifiers.

Section 1. Household Member Roster

This section determines who is and who is not a member of the household and gathers information on each member's basic characteristics – gender, age, marital status, relationship to the head of the household, and whether the member's parents live in the household. The list of household members compiled in this section is used throughout the survey, including in the agricultural questionnaires, whenever reference to individual household members is made. To the extent that standard household membership definitions in partner countries diverge from the one used in this generic section, these should be adjusted accordingly.

Section 2. Education

This section records a set of basic educational outcomes of the household members. For data reliability, household members are strongly recommended to answer on their own behalf (Bardasi et al., 2011; Dillon et al., 2012). Information on literacy, the highest level of formal education is collected individually for each household member five years or older. Levels of educational achievement vary from country to country and need to be adjusted in line with the local context. Further, the section enquires about current school attendance and reasons for absence from school, allowing for a fuller picture of household welfare.

Section 3. Labor and time use

This section is an important component of the Non-Farm Income and Living Standards Household Questionnaire, collecting information on income from wage employment and how household members spend their time between major work activities. As with the Education section, it is again recommended that each member responds for him or herself. The section has four key elements: first, it captures key labor market indicators, employment by type of job (e.g. wage work, own-account work, apprenticeship, etc.), unemployment, inactivity, and the potential labor force. Second, it captures household member income from wage employment and the sector of each wage job (own-account earnings are captured in the Household Enterprises section). Third, it covers time spent on non-employment activities, primarily own-use production of goods and services (time spent collecting firewood and water; weaving, sewing, textile production for household use; making and processing agricultural and non-agricultural goods for own final use; caring for children, adults, or elderly; cooking/food and meals management and preparation). Since income, activity, and time-use data are sex-disaggregated, this section is key for analyzing gender dynamics in the agricultural sector.

Section 4. Financial Access

This short ILS-HH section is designed to gather gender-disaggregated information on access to formal or informal savings mechanisms and mobile money.

Section 5. Food Insecurity Experience Scale

This section collects information on the Food Insecurity Experience Scale (FIES) with reference to the last 12 months. While a full food consumption module is out of the scope of this questionnaire, food security information is often one of the predictors of poverty, which may be used together with housing, assets, and other household characteristics to create an indication of household welfare. The FIES is also used to monitor SDG 2.1.2.

Section 6. Housing Conditions

Housing quality, access to basic services, and housing tenure are key aspects of standards of living. The ILS-HH Housing Conditions section aims to efficiently capture the most important aspects of housing conditions. It focuses on dwelling ownership and documentation, dwelling characteristics (roof, walls, floor type; number of rooms), source of lighting and electricity, cooking, water and sanitation.

Section 7. Household Enterprises

The ILS-HH section on non-agricultural household enterprises gathers information on the portion of household income derived from, and time spent working in, self-employment outside of agriculture. The household enterprise section captures key aspects of intra-household decision-making over non-agriculture production activities. The section is structured in several subsections: first, the basic characteristics of the household enterprise, including ownership structure and decision-making within the household, industry, and type of activity pursued – these may be customized to reflect the most common industries in partner countries; second, activity levels during the past year and family and hired labor inputs; third, sales and profits, including decision-making over business proceeds; fourth, input costs in the last year. The non-agricultural household enterprise section is a key component in understanding household income from sources other than agriculture.

Section 8. Other Income

This section collects information on the household's income from sources other than agriculture (in the ILP-AG questionnaire), wage employment (in the Labor and Time Use section), and non-agricultural self-employment (in the Household Enterprise section). The Other Income section covers five broad categories with several income sources in each category: Transfers, including remittances and government assistance; pensions and investment income; rental income; revenues from the sales of assets; and other income sources such as inheritance or lottery winnings. The section records which household members decide over the proceeds from each income source. Partner countries may adjust and add to those categories and pertinent items to reflect the country-specific context.

Section 9. Asset Ownership

Ownership of major categories of consumer durable goods that typically last longer than a year, such as televisions, bicycles, or cars, is captured in this section, including who, within the household, owns these assets. This information provides a simple indicator of the household's living standards, facilitating an understanding of the linkages between agriculture and household and individual welfare outcomes. As in the previous section, partner countries may customize the list of durable goods in line with the local context. The section is set up to allow for gender disaggregation in asset ownership.

Section 10. Shocks and Coping Strategies

This section is designed to capture whether the household has experienced an unusual and severe event, such as a drought or the death of a household member, that affected its living standards. It is administered at the household level. A list of common shocks is provided but should be adjusted to reflect the most important of such events that affect populations in a given country. The section gathers information on how the shock affected the household in four domains: income, assets, food production, food stocks, and food purchases ('increase', 'decrease', 'did not change'), as well as the strategies the household employed to regain previous welfare levels (in case of a negative shock).

Section 11. Food Groups

This brief section collects information about the different food groups (e.g. cereals, vegetables, fruit, etc.) which the household has consumed in the last seven days, in line with the World Food Programme's Food Consumption Score (FCS). While a full food consumption module is out of the scope of this questionnaire, food group information is often one of the predictors of poverty, which may be used together with housing, assets, and other household characteristics to create an indication of household welfare.

Section 12. Land Tenure

This section collects tenure-related information on all land parcels which at least one household members owns, uses, or holds use rights to, regardless of the manner in which the parcel is utilized. Therefore, this section will roster both agricultural and non-agricultural land jointly, with agricultural parcels being fed forward into the ILP-AG questionnaire for the collection of additional agricultural data. This section is designed to collect the data necessary for the computation of SDG indicators 1.4.2 and 5.a.1, both of which measure security of land tenure at the individual level. Depending on the sampling strategy employed in the survey, the data collected through this section may be sufficient for monitoring of these two SDG indicators. For details on the requirements of these indicators and detailed guidance on the implementation of this particular section, see FAO, World Bank, and UN Habitat (2019). Note that in the Agricultural Program, this section should be moved out of the ILS-HH questionnaire and into the beginning of the ILP-AG questionnaire, and the scope of parcels to be listed should be restricted to parcels used, at least in part, for agriculture.

VII. Production Methods and Environment (PME-AG)

The Production Methods and Environment (PME) rotating tool includes the thematic areas of the AGRIS Production Methods and Environment questionnaire and the questions required for SDG indicator 2.4.1. More information on the objectives, structure, and indicators of the AGRIS PME questionnaire can be found in the AGRIS Handbook (GSARS, 2017, page 255-300) and information related to SGD indicator 2.4.1 can be found in the FAO SDG indicator 2.4.1 Methodological Note (FAO, 2018a).

The PME questionnaire focuses on energy use, land use, soil conservation methods, irrigation methods, soil fertilization, seed utilization, plant protection products, animal reproduction methods, veterinary products used, animal housing, manure management, organic farming, agroforestry, services and infrastructure used by the holding, adaptation to climate change, and hazards.

The PME questionnaire is integrated with the CORE-AG instrument in a similar way as other instruments, such as the CORE-AG and ILP-AG, and is supposed to be administered in the same way: in a post-planting visit and a post-harvest visit, and with a minor season instrument for the minor agricultural season as well as a non-household sector version.

The PME questionnaire is currently undergoing peer review. The questionnaire will made available upon finalization of the review and appropriate revisions. A tentative outline of the PME questionnaire sections and content are provided in Table 15 and Table 16 below, but are subject to change.

A. Post-Planting PME-AG

TABLE 15. TENTATIVE OVERVIEW OF PME-AG POST-PLANTING TOPICS

Topics and Questionnaire Sections	Level of Data Collection	PME-AG vs. CORE-AG coverage
0B Holding Identification	Holding	Identical
0C Roster and Education of Household Members	Holding	Identical
0D Agricultural Activities	Holding	Expanded
1A Agricultural Parcel Roster and Details	Parcel	Expanded
1B Soil Management and Health	Parcel	Only in PME
2 Plot Roster and Details	Parcel-Plot	Expanded
3 Crop Roster	Parcel-Plot	Expanded
4 Seed Use	Crop	Expanded

B. Post-Harvest PME-AG

TABLE 16. TENTATIVE OVERVIEW OF PME-AG POST-HARVEST TOPICS

Topics and Questionnaire Sections	Level of Data Collection	PME-AG vs. CORE-AG coverage
0B. Energy & Irrigation (General)	Holding	Only in PME
0C. Irrigation (Pastures and Meadows)	Parcel	Only in PME
0D. Irrigation & Land Preparation (Cultivated Parcels)	Parcel	Only in PME
0E. Rice Production Methods	Parcel - Plot	Only in PME
1A. Temporary Crop Production	Parcel-Plot-Crop	Expanded
1B. Temporary Crop Destination	Crop	Identical
2A. Tree & Permanent Crop Production	Parcel-Plot-Crop	Expanded
2B. Tree & Permanent Crop Destination	Crop	Identical
3A. Crop By-Products	By-Product	Only in PME
3B. Processing crop production	Product	Only in PME
4A. Input Roster	Input Type	Expanded
4B. Input Details	Input Type	Only in PME
5A. Livestock - Ownership	Livestock Type	Expanded
5B. Livestock – Change in Stock (Ruminants)	Livestock Type	Identical
5C. Livestock – Change in Stock (Poultry)	Livestock Type	Identical
5D. Livestock – Milk Production	Livestock Type	Identical
5E. Livestock – Egg Production	Livestock Type	Identical
5F. Livestock – Other Livestock Products	Product Type	Identical
5G. Livestock – Breeding & Health	Livestock Type	Only in PME
5H. Livestock – Housing	Livestock Type	Only in PME
5I. Livestock – Feed & Water	Livestock Type	Only in PME
5J. Livestock – Equipment & Transportation	Livestock Type	Only in PME
6A. Aquaculture Production	Product Type	Expanded
7A. Fishery Production	Product Type	Identical
8A. Forestry Production	Product	Expanded
9. Labor	Worker type	Expanded
13. Access to Information	Holding	Only in PME
15. Waste Management	Holding	Only in PME
16. GHG & Environmental Issues	Holding	Only in PME
17. Climate & Environmental Shocks	Holding	Only in PME
19. Food Security Experience Scale	Household	Only in PME

VIII. Machinery, Equipment, and Assets (MEA-AG)

The Machinery, Equipment, and Assets (MEA) rotating questionnaire is designed based on the AGRIS *Machinery, Equipment and Assets* (MEA) tool, with complementary questions added to the original AGRIS module. The MEA questionnaire collects data on the machinery, equipment, and assets of agricultural holdings, focusing primarily on the types and numbers of machinery, equipment and assets used, as well as their age and ownership. Questions on marketing and access to services are also included.

A. Post-Planting MEA

TABLE 17. OVERVIEW OF MEA POST-PLANTING TOPICS

The MEA questionnaires are only present in the post-harvest visit, therefore the post-planting questionnaire is identical to that in the CORE-AG.

Topics and Questionnaire Sections	Level of Data Collection	MEA-AG vs. CORE-AG coverage
0B Identification of the Holding	Holding	Identical
0C Roster and Education of Household Members	Holding	Identical
0D Agricultural Activities	Holding	Identical
1 Agricultural Parcel Roster and Details	Parcel	Identical
2 Plot Roster and Details	Parcel-Plot	Identical
3 Crop Roster	Parcel-Plot	Identical
4 Seed Use	Crop	Identical
5 Land Use	Holding	Identical

B. Post-Harvest MEA

TABLE 18. OVERVIEW OF MEA POST-HARVEST TOPICS

Topics and Questionnaire Sections	Level of Data Collection	MEA-AG vs. CORE-AG coverage
1A. Temporary Crop Production	Parcel-Plot-Crop	Identical
1B. Temporary Crop Destination	Crop	Expanded
2A. Tree & Permanent Crop Production	Parcel-Plot-Crop	Identical
2B. Tree & Permanent Crop Destination	Crop	Expanded
3C. Input Use & Acquisition	Holding	Identical
4. Non-Residential Buildings - Crops	Holding	Only in MEA
5A. Livestock - Ownership	Livestock Type	Expanded
5B. Livestock – Change in Stock (Ruminants)	Livestock Type	Expanded
5C. Livestock – Change in Stock (Poultry)	Livestock Type	Expanded
5D. Livestock – Milk Production	Livestock Type	Identical
5E. Livestock – Egg Production	Livestock Type	Identical
5F. Livestock – Other Livestock Products	Product Type	Identical
6. Livestock - Buildings	Holding	Only in MEA
7. Machine & Equipment	Holding	Only in MEA
8. Aquaculture Production	Product Type	Identical
9. Fishery Production	Product Type	Identical
10. Forestry Production	Product	Identical
11 Labor	Worker type	Identical
12 Services	Holding	Only in MEA

IX. Other specialized instruments and extensions

Additional rotating instruments focused on specialized agricultural topics, and including a few topics not currently addressed by the existing survey instruments, will be designed and made available to country partners who wish to insert them in one of the rotating years. Topics to be included in the additional rotating instrument(s) include storage facilities, marketing, extension services, and access to credit. The last topic, access

to credit, is currently addressed in the household questionnaire but without distinction for agricultural use of the credit; thus the need to ensure that: i) the collected information is relevant for agriculture; and ii) the same or similar information is collected in the Agricultural Model.

Questionnaire modules are currently under development for the collection of data relevant for SDG 1.5.2 (Direct disaster economic loss in relation to global GDP) and SDG 12.3.1 (Global food losses). Additional rotating questionnaires will be designed on a demand-driven basis, ensuring country partners are able to utilize the 50x2030 framework to capture all agricultural aspects of interest.

References

50x30 Initiative. 2020. “An Introduction to the 50x2030 Initiative.” Technical Paper Series #1. World Bank, Rome.

Abay, K. A., Abate, G. T., Barrett, C. B., & Bernard, T. 2019. “Correlated non-classical measurement errors, ‘Second best’ policy inference, and the inverse size-productivity relationship in agriculture.” *Journal of Development Economics* 139: 171–184.

Arthi, V., Beegle, K., De Weerdt, J., Palacios-López, A. 2018. “Not your average job: Measuring farm labor in Tanzania.” *Journal of Development Economics* 130: 160–172.

Bardasi, E., Beegle, K., Dillon, A., Serneels, P. 2011. “Do labor statistics depend on how and to whom the questions are asked? Results from a survey experiment in Tanzania*.” The World Bank Economic Review* 25: 418–447.

Beegle, K., De Weerdt, J., Friedman, J., Gibson, J. 2012. “Methods of household consumption measurement through surveys: Experimental results from Tanzania.” *Journal of Development Economics* 1: 3–18.

Carletto, C., Gourlay, S., Murray, S. and Zezza, A. 2017. “Cheaper, faster and more than good enough: is GPS the new gold standard in land area measurement?” *Survey Research Methods*, 11(3): 235–265.

Carletto, C., Gourlay, S., and Winters, P. 2015. “From guesstimates to GPStimates: land area measurement and implications for agricultural analysis.” *Journal of African Economies* 24(5): 593–628.

Carletto, C., Savastano, S., and Zezza, A. 2013. “Fact or artifact: The impact of measurement errors on the farm size–productivity relationship.” *Journal of Development Economics*, 103(C): 254–261.

Chen, J.J., Collins, L.A. 2014. “Let’s talk about the money: Spousal communication, expenditures, and farm production.” *American Journal of Agricultural Economics* 96(5): 1272–1290.

Dammert, A.C., & Galdo, J. 2013. “Child labor variation by type of respondent: Evidence from a large-scale study.” *World Development* 51(C): 207–220.

Desiere, S., & Jolliffe, D. 2018. Land productivity and plot size: “Is measurement error driving the inverse relationship?” *Journal of Development Economics* 130(C): 84–98.

Dillon, A., Bardasi, E., Beegle, K., Serneels, P. 2012. “Explaining variation in child labor statistics.” *Journal of Development Economics 98(1):* 136–147.

Doss, C., Kieran, C., Kilic, T. 2017. “Measuring ownership, control, and use of assets.” Policy research working paper. World Bank, Washington, DC.

FAO. 2015. “World Census of Agriculture 2020. Volume 1: Programme, concepts and definitions.” FAO, Rome.

FAO. 2018a. SDG Indicator 2.4.1 “Proportion of Agricultural Area under Productive and Sustainable Agriculture: Methodological Note.” FAO, Rome. Available in: http://www.fao.org/3/CA2639EN/ca2639en.pdf. Access in: May 2019.

FAO. 2018b. “Handbook on crop statistics: improving methods for measuring crop area, production and yield.” FAO, Rome.

FAO, World Bank, UN-Habitat. 2019. “Measuring Individuals’ Rights to Land: An Integrated Approach to Data Collection for SDG Indicators 1.4.2 and 5.a.1.” World Bank, Washington, DC. © FAO, World Bank, and UN-Habitat. License: CC BY-NC-SA 3.0 IGO.

Fisher, M., Reimer, J.J., Carr, E.R., 2010. “Who should be interviewed in surveys of household income?” *World Development* 38: 966–973.

Gaddis, I., Siwatu, G.O., Palacios-Lopez, A., Pieters, J. 2019. “Measuring Farm Labor: Survey Experimental Evidence from Ghana.” *Policy Research Working Paper.* World Bank, Washington, DC.

Global Strategy to Improve Agricultural and Rural Statistics. 2017. “Handbook on the Agricultural Integrated Survey (AGRIS).” Rome. Available in: http://gsars.org/en/agris-handbook-on-the-agricultural-integrated-survey/. Access in: May 2019.

Gourlay, S., Betemariam, E., Shepherd, K., Carletto, G. 2017. “Collecting the Dirt on Soils: Advancements in Plot-Level Soil Testing and Implications for Agricultural Statistics.” *Policy Research Working Paper (8057).* World Bank, Washington, DC.

Gourlay, S., & Kilic, T., Lobell, D. B. 2019. “A new spin on an old debate: Errors in farmer-reported production and their implications for inverse scale - Productivity relationship in Uganda.” *Journal of Development Economics* 141. 102376.

Jacobs, K., Kes, A. (2015). “The ambiguity of joint asset ownership: cautionary tales from Uganda and South Africa.” *Feminist Economics* 21: 23–55.

Janzen, S.A., (2018). “Child labour measurement: Whom should we ask?” *International Labour Review*. 157(2): 169–191

Kilic, T., Moylan, H. 2016. “Methodological experiment on measuring asset ownership from a gender perspective (MEXA).” World Bank, Washington, DC.

Kilic, T., Moylan, H. G., Ilukor, J., Mtengula, C., Pangapanga-Phiri, I. 2018. “Root for the Tubers: Extended-harvest crop production and productivity measurement in surveys.” *World Bank Policy Research Working Paper* (8618).

Oseni, G., Durazo, J., McGee, K., 2017. “The use of non-standard units for the collection of food quantity. A guidebook for improving the measurement of food consumption and agricultural production in living standards surveys.” *LSMS Guidebook*. World Bank, Washington, DC.

Palacios-Lopez, A., Christiaensen, L., Kilic, T. 2017. “How much of the labor in African agriculture is provided by women?” *Food Policy 67*: 52–63.

Schündeln, M. 2018. “Multiple visits and data quality in household surveys.” *Oxford Bulletin of Economics and Statstics 80*: 380–405.

Sorrenti, S. 2017. “Non-wood forest products in international statistical systems.” *Non-wood Forest Products Series no. 22.* FAO, Rome.

Twyman, J., Useche, P., Deere, C.D. 2015. “Gendered perceptions of land ownership and agricultural decision-making in Ecuador: Who are the farm managers?” *Land Economics 91*(3): 479–500.

Wollburg, P., Tiberti, M., Zezza, A. 2020. “Recall length and measurement error in agricultural surveys.” *World Bank Policy Research Working Paper (9128)*. World Bank, Washington, DC.

Zezza, A., Pica-Ciamarra, U., Mugera, H.K., Mwisomba, T., Okello, P. 2017. “Measuring the role of livestock in the household economy. A guidebook for designing household survey questionnaires.” *LSMS Guidebook*. World Bank, Washington, DC.

Appendix I: Indicator Coverage

A. SDG indicators

To monitor progress of the SDGs, the international community has established 231 indicators, 21 of which are focused on agriculture and food security. However, the international community soon realized data sources were unable to generate several indicators designed to track progress in agriculture and food security.

While the *50x2030 Initiative* was designed with an eye for collecting data on SDG Indicators 2.3.1 and 2.3.2, the scope of the program extends beyond these two indicators.

The table below provides an overview of the **high priority SDG indicators** promoted by the *50x2030 Initiative*. It indicates the standard questionnaires where the required information is collected and their recommended frequency.

TABLE A.1 – SDG INDICATORS THE INITIATIVE AIMS TO PRODUCE [18]

SDG #	Indicator Title	Frequency	Questionnaire(s)
2.3.1	Volume of production per labor unit by classes of farming / pastoral / forestry enterprise size	3 years	ILP-AG
2.3.2	Average income of small-scale food producers, by sex and indigenous status	3 years	ILP-AG
2.4.1	Proportion of agricultural area under productive and sustainable agriculture.	3 years	PME
5.a.1.a	Proportion of total agricultural population with ownership or secure rights over agricultural land, by sex	3 years	ILS-HH (in the Integrated and Rural Model) ILP-AG (in the Agricultural Model)
5.a.1.b	Share of women among owners or rights-bearers of agricultural land, by type of tenure	3 years	ILS-HH (in the Integrated and Rural Model) ILP-AG (in the Agricultural Model)

The table below lists **additional SDG indicators** that can be collected with the 50x2030 standard survey instruments. It indicates the questionnaires where the required information is collected and their frequency.

TABLE A.2 – ADDITIONAL SGD INDICATORS PROMOTED BY THE INITIATIVE

SDG #	Indicator Title	Recommended Frequency	Questionnaire(s)
1.4.2	Proportion of total adult population with secure tenure rights to land, with legally recognized documentation and who perceive their rights to land as secure, by sex and by type of tenure *	3 years	ILS-HH (in the Integrated Ag and Rural Survey program)
1.5.2‡	Direct disaster economic loss in relation to global GDP **	To be determined	CORE; ILP; MEA through set of optional questions
2.1.2	Prevalence of moderate or severe food insecurity in the population, based on the Food Insecurity Experience Scale*		ILS-HH (in the Integrated Ag and Rural Survey program)

[18] Indicators may not be available for all subgroups as identified in the SDG Indicator methodological notes.

			PME
12.3.1	Global food losses ***	3 years	Harvest and Post-Harvest Losses (HPHL) (under review)

* *Indicator can be computed only if the survey covers non-agricultural households (i.e., in the Integrated Agricultural and Rural Model) and urban areas*

** *Partial: The optional set of questions allows only the computation of losses in the agricultural sector. Methodology under development.*

*** *Coverage under 50x2030 will be limited to 12.3.1a (Food Loss Index) and to losses at farm level (the main critical loss point in low-income countries). It will not cover losses during transport, wholesale, off-farm storage and processing.*

‡ *Questions for measuring Indicator 1.5.2 are currently under review. They will be added and/or amended in the 50x2030 questionnaires upon finalization.*

The following text provides a review of the SDGs that are addressed by the Initiative, discussing in detail the data required and the corresponding instruments.

SDG 1.4.2 Proportion of total adult population with secure tenure rights to land, with legally recognized documentation and who perceive their rights to land as secure, by sex and by type of tenure

This indicator requires individual-level data concerning the legal rights over land and the security of those rights. Based on the indicator methodology, the first dimension shall be measured through the presence of a document in the name of the individual while the second dimension shall be measured through the right to bequeath and the perception over security of rights.

The indicator is applicable to all households, regardless of their engagement in agriculture. Therefore, the required data shall be collected on agricultural and non-agricultural households. In addition, the indicator requires a nationally representative sample, including rural and urban households. As a consequence, the capacity to monitor this indicator depends on the presence of a nationally representative sample.

The data required for the calculation of this indicator can be found in the household questionnaire (land tenure section), as illustrated in the table below.

In the **Integrated Agricultural and Rural Model**, the data required for the calculation of this indicator can be found in the household questionnaire (land tenure section), as illustrated in the table below. The computation of this indicator may be heavily affected by the lack of urban coverage.

In the **Agricultural Model**, the data required for the calculation of this indicator shall be found in the ILP-AG questionnaire. However, in this case, the computation of this indicator is affected by the lack of the right sample universe and may be significantly affected by the lack of urban coverage.

TABLE A.3 – DATA REQUIREMENTS FOR SDG 1.4.2

Data required	Questionnaire(s) / Section(s)
Availability of a legally recognized document for the parcel	ILS-HH – LAND TENURE OR ILP-AG
Name of the household members listed on the document	ILS-HH – LAND TENURE OR ILP-AG
Who in the household has the right to bequeath the parcel	ILS-HH – LAND TENURE OR ILP-AG

Risk that the household members who own/hold use right involuntary lose their rights on the parcel	ILS-HH – LAND TENURE OR ILP-AG

SDG 1.5.2 – Direct disaster economic loss in relation to global gross domestic product (GDP)

This indicator measures the ratio of direct economic loss attributed to disasters in relation to GDP. Direct economic loss refers to the monetary value of total or partial destruction of physical assets existing in the affected area.

The questions required for the calculation of this indicator can be located in different sections of the CORE-AG questionnaires, as detailed in the table below. However, the formulation of specific questions are currently under review and may be revised.

The SDG 1.5.2 indicator refers to losses in relation to global GDP. The 50x2030 Initiative can only contribute by measuring the losses related to the agricultural sector. For this reason, SDG indicator 1.5.2 can be covered only partially.

TABLE A.4. DATA REQUIREMENTS FOR SDG 1.5.2

Data Required	Questionnaire(s) / Section(s)
Reason for not harvesting	TEMPORARY CROP PRODUCTION
Percentage of reduced harvests due to disasters (compared to pre-disaster harvests or expectations)	TEMPORARY CROP PRODUCTION
Reasons for the less crop harvested area than crop planted area	TEMPORARY CROP PRODUCTION
Percentage of plot area planted with crop not harvested due to disasters	TEMPORARY CROP PRODUCTION
Losses in post-harvest storage of field crops harvests due to disasters	TEMPORARY CROP DESTINATION
Trees affected or destroyed by disasters in the last 12 months	PERMANENT CROP PRODUCTION
Number of trees destroyed by disasters	PERMANENT CROP PRODUCTION
Quantity of production not harvested due to drought and disasters	PERMANENT CROP PRODUCTION
Reduction in harvest of trees or permanent crops due to disasters (compared to pre-disaster yield expectations or previous harvests)	PERMANENT CROP PRODUCTION
Losses in post-harvest storage of trees/permanent crops harvested in the last 12 months	PERMANENT CROP DESTINATION
Losses of inputs purchased and stored due to disasters since the beginning of the reference agricultural season	INPUT USE AND ACQUISITION
Quantities of inputs (machinery/equipment/assets) damaged or destroyed by disasters	INPUT USE AND ACQUISITION
Number of animals died of natural causes in the past 12 months	CHANGE IN STOCK
Number of animals killed by disasters (including epidemics and drought-related causes) in the last 12 months	CHANGE IN STOCK
Number of animals died of natural causes in the past 3 months	CHANGE IN STOCK - POULTRY
Quantity of the *(fodder / crop residues / industrial by-products / roots & tubers / concentrates / feed supplements)* purchased in the past 12 months destroyed by disasters	BREED HOUSE WATER FEED
Quantity of stored milk destroyed by disasters during the last 12 months	MILK PRODUCTION

Losses of other product quantities in the past 12 months due to disasters	OTHER LIVESTOCK PRODUCTS
Total quantities of [aquaculture item] lost or not collected due to disasters in the past 12 months?	AQUACULTURE PRODUCTION

SDG 2.1.2 – Prevalence of moderate or severe food insecurity in the population, based on the Food Insecurity Experience Scale (FIES)

The methodology for SDG 2.1.2, for which FAO is the custodian agency, has been developed and defined to be that of the Food Insecurity Experience Scale (FIES). The FIES requires the collection of eight survey questions, which may be asked at the household or individual level, per FIES methodology. In the 50x2030 Initiative's reference questionnaires, the household-level FIES is embedded in both the ILS-HH and PME-AG questionnaires. Note that unless the sample is expanded to be nationally representative, the 50x2030 questionnaires will allow for partial reporting of SDG 2.1.2 only.

SDG 2.3.1 – Volume of production per labor unit by classes of farming / pastoral / forestry enterprise size

A key concept for SDG indicators 2.3.1 and 2.3.2 is that of small-scale food producers. Using a relative approach, FAO defines small-scale food producers based on two criteria:

1. Physical size

- operate an amount of land falling in the first two quintiles (the bottom 40 percent) of the cumulative distribution of land size at national level (measured in hectares); and
- operate a number of livestock falling in the first two quintiles (the bottom 40 percent) of the cumulative distribution of the number of livestock per production unit at national level (measured in Tropical Livestock Units – TLUs)

2. Economic size

- Obtain an annual economic revenue from agricultural activities falling in the first two quintiles (the bottom 40 percent) of the cumulative distribution of economic revenues from agricultural activities per production unit at national level (measured in Purchasing Power Parity Dollars).

For the measurement of the indicator, it is necessary that:

a) the total volume of production from crop, livestock, aquaculture, fishery and forestry activities is expressed in monetary terms in purchasing power parity (PPP) dollars.
b) the volume of labor (expressed as person-days), includes all forms of labor (hired workers, household members, exchange labor, etc.).

The data required for the calculation of this indicator are located in different sections of the ILP-AG questionnaire, as detailed in the table below.

TABLE A.5. – DATA REQUIREMENTS SDG 2.3.1

Data Required	Questionnaire(s) / Section(s)
Value of crop production (including on-farm processed products)	TEMPORARY CROP PRODUCTION TREES & PERMANENT CROP PRODUCTION PROCESSING CROP PRODUCTION
Value of livestock production	MILK PRODUCTION OTHER LIVESTOCK PRODUCTS
Value of aquaculture and fishing production	AQUACULTURE PRODUCTION FISHERY PRODUCTION
Value of forestry production	FORESTRY PRODUCTION
Labor input (time) to crop production	LABOR INPUT (HOUSEHOLD) LABOR INPUT (EXTERNAL)
Labor input (time) to livestock and livestock products	LIVESTOCK LABOR
Labor input (time) to aquaculture and fishing production	AQUACULTURE LABOR FISHERY LABOR
Labor input (time) to forestry production	FORESTRY LABOR
Amount of livestock raised (expressed in TLU)	LIVESTOCK OWNERSHIP
Amount of agricultural land used	PLOT ROSTER AND DETAILS LAND USE
Revenues from crop production	TEMPORARY CROP DESTINATION TREES AND PERMANENT CROP DESTINATION

	PROCESSING CROP PRODUCTION
Revenues from livestock production	MILK PRODUCTION OTHER LIVESTOCK PRODUCTS
Revenues from aquaculture and fishing production	AQUACULTURE PRODUCTION FISHERY PRODUCTION
Revenues from forestry production	FORESTRY PRODUCTION

SDG 2.3.2 – Average income of small-scale food producers, by sex and indigenous status

The indicator defines small-scale food producers using the same criteria presented for SDG 2.3.1.

For the actual measurement of the indicator, it is necessary to compute the income generated from agricultural activities, which is done throughout the ILP-AG questionnaire.

SDG 2.4.1 – Proportion of agricultural area under productive and sustainable agriculture

The indicator is defined by the formula:

$$SDG2.4.1 = \frac{Area\ under\ productive\ and\ sustainable\ agriculture}{Agricultural\ land\ area}$$

This implies the need to measure both the extent of land under productive and sustainable agriculture (the numerator), as well as the extent of land area under agriculture (the denominator).

The *numerator* captures the three dimensions of sustainable production: environmental, economic and social. It corresponds to agricultural area of the farms that satisfy sub-indicators selected across all three dimensions.

The *denominator* is agricultural land area managed by agricultural holdings, defined as the sum of agricultural area utilized by agricultural holdings that are owned (excluding rented-out), rented-in, leased, sharecropped or borrowed. State or communal land used by farm holdings is not included.

The data required for the calculation of this indicator are located in the CORE-AG and in a rotating PME questionnaire. The table below provides an overview of the 11 sub-indicators needed for the monitoring of SDG 2.4.1.

TABLE A.6 – SUB-INDICATORS OF SDG 2.4.1

Theme	Sub-indicators
Land productivity	Farm output value per hectare
Profitability	Net farm income
Resilience	Risk mitigation mechanisms
Soil health	Prevalence of soil degradation
Water use	Variation in water availability
Fertilizer pollution risk	Management of fertilizers
Pesticide risk	Management of pesticides
Biodiversity	Use of biodiversity-friendly practices
Decent employment	Wage rate in agriculture
Food security	Food insecurity experience scale (FIES)
Land tenure	Secure tenure rights to land

SDG 5.a.1 – a) Proportion of total agricultural population with ownership or secure rights over agricultural land, by sex; and b) share of women among owners or rights-bearers of agricultural land, by type of tenure
This indicator requires individual-level data concerning the legal rights over agricultural land, including de jure and de facto rights. Based on the indicator methodology, the first dimension shall be measured through the presence of a document in the name of the individual while the second dimension shall be measured through the alienation rights (i.e., right sell, right to bequeath).

Although the computation formulas of SDG 5.a.1 and SDG 1.4.2 are different, the two indicators have many questions in common. This is the result of a methodological work conducted by the custodian agencies to align the methodologies and limit the burden of data collection at national level.

Unlike SDG 1.4.2, the indicator is applicable only to agricultural households – i.e., household cultivating crops or raising livestock. Therefore, this indicator does not require a nationally representative sample of all households. In addition, it focuses on agricultural land, therefore it does not require the listing of non-agricultural parcels.

In the **Integrated Agricultural and Rural Model**, the data required for the calculation of this indicator can be found in the household questionnaire (land tenure section), as illustrated in the table below. However, if urban areas are excluded from the sample, countries may want to limit the data collection only to agricultural parcels (i.e. only collect SDG 5.a.1). In such a case, the existing section may be adapted and transferred to the ILP-AG.

In the **Agricultural Model**, the data required for the calculation of this indicator shall be found in the ILP-AG questionnaire.

TABLE A.7 – DATA REQUIREMENTS SDG 5.A.1

Data required	Questionnaire(s) / Section(s)
Availability of a legally recognized document for the parcel	ILS-HH – LAND TENURE (OR ILP-AG)
Name of the household members listed on the document	ILS-HH – LAND TENURE (OR ILP-AG)
Who in the household has the right to sell the parcel	ILS-HH – LAND TENURE (OR ILP-AG)
Who in the household has the right to bequeath the parcel	ILS-HH – LAND TENURE (OR ILP-AG)
Use of the parcel	ILS-HH – LAND TENURE (OR ILP-AG)

SDG 12.3.1 – Global food loss index
The 50x2030 Initiative will support the collection of data required for SDG 12.3.1 once the indicator methodology has been finalized.

B. CAADP indicators

At the African Union Summit in Malabo, Equatorial Guinea in June 2014, Heads of State and Government of the African continent reconfirmed that agriculture should remain high on the development agenda of the continent and is a critical policy initiative for African economic growth and poverty reduction. The Malabo Summit adopted a remarkable set of concrete agriculture goals to be attained by 2025. The Malabo Declaration on Accelerated Agricultural Growth and Transformation for Shared Prosperity and Improved Livelihoods is a set of goals showing a more targeted approach to achieve the agricultural vision of shared prosperity and improved livelihoods for the continent. The Comprehensive African Agricultural Development Programme (CAADP) establishes indicators that should be used to track progress toward the Malabo Declaration goals in agriculture and food security. To date, many countries lack adequate data sources to quantify key indicators for CAADP achievement.

The survey instruments promoted through the *50x2030 Initiative* allow the monitoring of nine CAADP indicators. The table below provides an overview of such indicators indicating the questionnaires where the required information is collected and their frequency.

TABLE B.1 – CAADP INDICATORS THE INITIATIVE AIMS TO PRODUCE

CAADP #	INDICATOR TITLE	FREQUENCY	QUESTIONNAIRE(S)
2.4	Proportion of men and women engaged in agriculture with access to financial services[19]	3 years	ILS-HH (in the Integrated Ag and Rural Survey Programme)
3.1i	Fertilizer consumption (kg of nutrients / ha of arable land)[20]	Annually	CORE
3.1ii	Growth rate of the size of irrigated areas from its value in the year 2000*	Annually	CORE
3.1iv	Proportion of farmers with access to agricultural advisory services	3 years	Rotating questionnaire. Placement to be determined
3.1vi	Proportion of farm households with ownership or secure land rights[21]**	3 years	ILP (in the Agricultural Survey Programme) ILS-HH (in the Integrated Ag and Rural Survey Programme)
3.2i	Growth rate of agriculture value added (in constant US dollars) per agricultural worker ***	Annually	CORE
3.2ii	Growth rate of agriculture value added (in constant US dollars) per hectare of agricultural arable land***	Annually	CORE
3.2iii	Growth rate of yields for the five national priority commodities, and possibly for the 11 African Union (AU) agriculture priority commodities[22]****	Annually	CORE

[19] This indicator aims to measure the number of men and women engaged in agriculture who are 'financially included'. Financial inclusion comprises ownership of at least one financial service, including bank and non-bank financial institutions (bank and savings accounts), mobile money, etc.

[20] This indicator aims to monitor the utilization of cost-effective and quality agricultural inputs to boost agricultural productivity. The quantity of fertilizer consumed in agriculture by a country is expressed in metric tons of plant nutrient.

[21] This indicator measures the number of farm households where at least one member is able to demonstrate property rights through documentation. Like SDG indicators 1.4.2 and 5.a.1, land ownership is defined according to local context, and the definition of ownership varies across countries

[22] The 11 AU priority commodities are rice, maize, legumes, cotton, oil palm, beef, dairy, poultry and fisheries, cassava, sorghum and millet.

4.1i	Growth rate of agriculture value added (in constant US dollars) ***	annually	CORE

* *While the Initiative supports the measurement of areas currently under irrigation, indicator 3.1ii can be calculated only if the baseline value is available.*

** *While SDG indicators 1.4.2 and 5.a.1 are individual level indicators, 3.1vi is a household level indicator. However, the data required for SDG 1.4.2 and SDG 5.a.1 can be used to generate indicator 3.1vi.*

*** *Agricultural surveys do not generate this indicator. However, they could provide data to inform the estimation of National Accounts.*

**** *While the Initiative supports the yield measurement, indicator 3.2iii can be calculated only if the baseline value is available.*

CAADP 2.4 - Proportion of population engaged in agriculture with access to financial services[23]

This indicator aims to measure the number of men and women engaged in agriculture who are 'financially included'. Financial inclusion comprises ownership of at least one financial service, including bank and non-bank financial institutions (bank and savings accounts), mobile money, etc.

The denominator of CAADP 2.4 indicator can be estimated from the demographic roster of the household questionnaire (ILS-HH) or from the 0C Roster and Education of Household Members of the CORE-AG, simply assuming that all men and women living into an agricultural household are classified as 'individuals engaged in agriculture'. The numerator can be derived from the household questionnaire.

TABLE B.2 – DATA REQUIREMENTS CAADP 2.4

Data required	Questionnaire(s) / Section(s)
Number of men and women engaged in agriculture	ILS-HH – DEMOGRAPHIC ROSTER OR CORE-AG – ROSTER AND EDUCATION OF HOUSEHOLD MEMBERS
Number of men and women with access to financial services	ILS-HH – ACCESS TO FINANCIAL SERVICES

CAADP 3.1i - Fertilizer consumption (kg of nutrients / ha of arable land)

This indicator aims to monitor the utilization of cost-effective and quality agricultural inputs to boost agricultural productivity. The quantity of fertilizer consumed in agriculture by a country is expressed in metric tons of plant nutrient.

The denominator of the CAADP 3.1i indicator can be estimated from the agricultural questionnaire (land use section). As for the numerator, the agricultural questionnaire does not collect nutrient quantities. However, the nutrient quantity could be estimated from the type of inorganic fertilizers reported, through reference tables.

TABLE B.3 – DATA REQUIREMENTS CAADP 3.1I

Data required	Questionnaire(s) / Section(s)
Amount of arable land	CORE-AG - LAND USE
Nitrogen Fertilizers (N total nutrients) Phosphate Fertilizers (P205 total nutrients) Potash Fertilizers (K20 total nutrients)	CORE-AG - INPUT USE & ACQUISITION

[23] Detailed definitions of the CAADP indicators can be found at: https://au.int/sites/default/files/documents/32377-doc-technical_guidelines_for_reporting_on_malabo_rev2_eng.pdf

CAADP 3.1ii - Growth rate of the size of irrigated areas from its value of the year 2000

This indicator also aims to monitor the utilization of cost-effective & quality methods to boost agricultural productivity.

It requires the total area under irrigation in a certain year (t) and the area under irrigation in the baseline year (2000). While the Initiative supports the measurement of areas currently under irrigation, indicator 3.1ii can be calculated only if the baseline value is available.

TABLE B.4 – DATA REQUIREMENTS CAADP 3.1II

Data required	Questionnaire(s) / Section(s)
Amount of land used for crops	CORE-AG – PLOT ROSTER & DETAILS
Presence of irrigation	CORE-AG – PLOT ROSTER & DETAILS

CAADP 3.1iv - Proportion of farmers with access to Agricultural Advisory Services

This indicator aims to measure the proportion of farmers with access to agricultural advisory services (AAS) through training, information sharing, and other extension support related services. The AAS can be provided through public extension services, agribusiness private companies, farmer organizations, cooperatives. Advisory services can be organized through physical trainings, ICT, videos, pamphlets, training school farms, etc.

Questions on access to agricultural advisory services are asked on a rotational basis.

CAADP 3.1vi - Proportion of farm households with ownership or secure land rights

This indicator measures the number of farm households[24] where at least one member is able to demonstrate property rights through documentation. Like SDG indicators 1.4.2 and 5.a.1, land ownership is defined according to local context, and the definition of ownership varies across countries.

While SDG indicators 1.4.2 and 5.a.1 are individual level indicators, 3.1vi is a household level indicator. However, the data required for SDG 1.4.2 and 5.a.1 can be used to generate indicator 3.1vi, as summarized below.

The denominator of the CAADP 3.1vi is simply given by the sum of households that reported to be cultivating crops, raising livestock or practicing aquaculture / fishery.

The numerator of the indicator may be derived from the ILS-HH questionnaire (land tenure section). As discussed above, this section collects parcel-level data on the availability of legally recognized documents and records which household members appear on the documents as rights holders.

Alternatively, it can be generated from the CORE-AG questionnaire (Agricultural Parcel Roster section), simply looking at the availability of legally recognized documents for the various parcels of land.

TABLE B.5 – DATA REQUIREMENTS CAADP 3.1VI

Data required	Questionnaire(s) / Section(s)
Availability of a legally recognized document for the parcel	ILS-HH – LAND TENURE (OR ILP-AG) CORE-AG – AG PARCEL ROSTER
Name of the household members listed on the document	ILS-HH – LAND TENURE

[24] Farm households are those engaged in any form of agriculture (livestock, crops, fisheries).

CAADP 3.2iii - Growth rate of yields for the five national priority commodities, and possibly for the 11 African Union (AU) agriculture priority commodities[25]

Based on the CAADP Technical Guidelines, it is suggested the baseline value of the yield (Y_{2015}) is calculated as the average yield over a three-to-five year period between 2011 and 2015. Therefore, for a given year (t), the growth rate of yields for an individual priority commodity is equal to = [100 x (Y_t - Y_{2015}) / Y_{2015}].

Similar to irrigation, while the 50x2030 Initiative survey tools allow the calculation of land and livestock productivity, the growth rate can be calculated only if productivity data are available for the previous years, specifically for the period 2011-15.

TABLE B.6 – DATA REQUIREMENTS CAADP 3.2II

Data required	Questionnaire(s) / Section(s)
Land productivity	CORE-AG/ ILP-AG – PLOT ROSTER & DETAILS CORE-AG/ ILP-AG – CROP ROSTER CORE-AG/ ILP-AG – TEMPORARY CROP PRODUCTION CORE-AG/ ILP-AG – TREE & PERMANENT CROP PRODUCTION
Livestock productivity	CORE/ ILP-AG – LIVESTOCK OWNERSHIP CORE-AG/ILP-AG – MILK PRODUCTION CORE-AG – EGGS PRODUCTION CORE-AG/ ILP-AG – OTHER LIVESTOCK PRODUCTS

CAADP 4.1i / 3.2i / 3.2ii - Growth rate of agriculture value added (in constant US dollars) / Growth rate of agriculture value added (in constant US dollars) per agricultural worker / Growth rate of agriculture value added (in constant US dollars) per hectare of agricultural arable land

As mentioned above, agricultural surveys are not directly used to generate this indicator. However, they can provide the data to inform the estimation of national accounts. In particular, the agriculture value added can be calculated from the value of agricultural products produced by the farms.

[25] The 11 AU priority commodities are rice, maize, legumes, cotton, oil palm, beef, dairy, poultry and fisheries, cassava, sorghum and millet.

C. Other indicators covered

TABLE C.1 – DATA ITEMS / INDICATORS COVERED IN CORE-AG QUESTIONNAIRE

Questionnaire Sections	Data items / indicators	Unit of observation
Composite indicators computed from different sections	SDG 1.5.2	
	Land productivity	
	Intra-HH decision making	
	Damage and losses due to disasters (*under review*)	
	CAADP 3.1i	
	CAADP 3.2iii	
	Farm typology	
	Value of production	
0.A. Interview cover	Region, province	Holding
	Coordinates (Lat-Long)	Holding
	Farm activity	Holding
0.B Holding identification	Legal status	Holding
	Distance from dwelling to parcel	Holding
	Location of agricultural activities	Holding
0.C. DemoEdu HH holder	Age, education, sex	Holding
	Type of holder	Holding
	Received training on agriculture	Holding
	Agricultural household members and relationship to the head	Holding
1. Agricultural Parcel Roster and Details	Number of parcels	Holding
	Land acquisition	Parcel
	Land tenure	Parcel
	Parcel area	Parcel
	Existence of system of irrigation	Parcel
	Irrigated area	Parcel
	Existence of erosion and erosion control	Parcel
	Existence and method of irrigation	Parcel
	Average number of crop plots per parcel	Parcel
2. Plot Roster and Details	Crop activities decision making	Parcel-Plot
	Agricultural land use	Parcel-Plot
	Plot area	Parcel-Plot
	Crop area	Parcel-Plot
	Mix-cropping	Parcel-Plot
3. Crop Roster	CORE-AG indicators	Parcel-Plot
	Crops per plot	Parcel-Plot
	Crop type	Parcel-Plot
	Area planted	Parcel-Plot
	Shelter type	Parcel-Plot
	Plantation period	Parcel-Plot
4. Seed Use and Acquisition	Seed type used	Crop
	Quantity of seeds planted	Crop
5. Land Use	Land use	Holding
1A. Temporary Crop Production	Fertilizer and pesticide use	Parcel-Plot-Crop
	Input use	Parcel-Plot-Crop
	Harvest-period	Parcel-Plot-Crop

	Post-harvest losses (reasons)	Parcel-Plot-Crop
	Crop production	Parcel-Plot-Crop
	Harvested area	Parcel-Plot-Crop
	Crop Yield	Parcel-Plot-Crop
1B. Temporary Crop Destination	Crop destination (condition and quantity)	Crop
	Sales earnings decision making	Crop
	Storage crops (quantity, condition and destination)	Crop
	Total value of sales	Crop
2A. Tree & Permanent Crop Production	Cultivation method	Parcel-Plot-Crop
	Number of trees/plants used	Parcel-Plot-Crop
	Plantation period	Parcel-Plot-Crop
	Harvest period	Parcel-Plot-Crop
	Post-harvest losses (reasons)	Parcel-Plot-Crop
	Crop production	Parcel-Plot-Crop
	Crop yield	Parcel-Plot-Crop
	Production use decision maker	Parcel-Plot-Crop
2B. Tree & Permanent Crop Destination	Crop destination (condition and quantity)	Crop
	Sales earnings decision making	Crop
	Storage crops (quantity, condition and destination)	Crop
	Total value of sales	Crop
3C. Input Use and Acquisition	Input use	Input type
	Quantity of input used	Input type
4A. Livestock – Ownership	Livestock numbers	Livestock Type
	Herd size and livestock concentration	Livestock Type
	Livestock managers	Livestock Type
	Sales earnings decision making	Livestock Type
	Control over and responsibility for raising livestock	Individual
4B. Livestock – Change in Stock (Ruminants)	Change in stock for ruminants in the last 12 months	Livestock Type
	Total value of purchased animals	Livestock Type
	Total revenues from live animal sales	Livestock Type
	Total revenues from slaughtered animal sales	Livestock Type
4C. Livestock – Change in Stock (Poultry)	Change in stock for poultry in the last 3 months	Livestock Type
	Total value of purchased animals	Livestock Type
	Total revenues from live animal sales	Livestock Type
	Total revenues from slaughtered animal sales	Livestock Type
4G. Livestock – Milk Production	Milk production (quantity)	Livestock Type
	Total revenues from sales	Livestock Type
4H. Livestock – Egg Production	Eggs production (quantity)	Livestock Type
	Total revenues from sales	Livestock Type
4I. Livestock – Other Livestock Products	Quantity produced in the last 12 months	Product Type
	Total revenues from sales	Product Type
5A. Aquaculture Production	Quantity produced in the last 12 months	Product Type
	Total revenues from sales	Product Type
6A. Fishery Production	Quantity produced in the last 12 months	Product Type
	Total revenues from sales	Product Type
7A. Forestry Production	Quantity produced in the last 12 months	Product
	Total revenues from sales	Product
9. Labor	Agricultural labor input per activity	work category

	Hired agricultural labor input	Gender and age of workers
	Free/exchange agricultural labor input	Gender and age of workers

TABLE C.2 – DATA ITEMS / INDICATORS COVERED IN ILP-AG QUESTIONNAIRE

Questionnaire Sections	Data items / indicators	Unit of observation
Composite indicators	CORE-AG indicators plus: SDG 2.3.1; 2.3.2; SDG 5.a.1, 1.4.2 Agricultural income Intra-household decision making CAADP 3.1$_{VI}$	
1. Agricultural Parcel Roster and Details	CORE-AG indicators plus:	Parcel
	Soil type	Parcel
	Existence of erosion and erosion control	Parcel
	Existence and method of irrigation	Parcel
2. Plot Roster and Details	CORE-AG indicators[1] plus:	Parcel-Plot
	Land preparation	Parcel-Plot
	Plot fallowing	Parcel-Plot
3. Crop Roster	CORE-AG indicators[1]	Parcel-Plot
4. Seed Use and Acquisition	CORE-AG indicators[1] plus:	Crop
	Quantity of seeds acquired	Crop
	Cost of seeds acquired	Crop
5. Land Use	CORE-AG indicators	Holding
1A. Temporary Crop Production	CORE-AG indicators[1]	Parcel-Plot-Crop
1B. Temporary Crop Destination	CORE-AG indicators[1]	Crop
3A. Labor Input by Household Members	Agricultural family labor input	Individual
3B. Labor Input (External Workers)	Hired agricultural labor input	Gender and age of workers
	Free/exchange agricultural labor input	Gender and age of workers
3C. Input Use and Acquisition	CORE-AG indicators[1] plus:	Household
	Quantity of seed acquired	Input type
	Cost of seed acquired	Input type
2A. Tree & Permanent Crop Production	CORE-AG indicators[1]	Parcel-Plot-Crop
2B. Tree & Permanent Crop Destination	CORE-AG indicators[1]	Crop
3D. Plant Acquisition	Quantity of plants/seeds acquired	Crop
	Cost of plants/seeds acquired	Crop
2C. Crop Processing	Quantity of processed goods produced	Processed product
	Value of sales of processed goods	Processed product
	Control over income from processed goods sales	Processed product
4A. Livestock - Ownership	CORE-AG indicators[1] plus:	Livestock Type
	Control over and responsibility for raising livestock	Individual
4B. Livestock – Change in Stock (Ruminants)	CORE-AG indicators[1]	Livestock Type
4C. Livestock – Change in Stock (Poultry)	CORE-AG indicators[1]	Livestock Type

4D. Livestock – Input Costs	Costs related to raising livestock	Livestock Category
4E. Livestock – Labor	Labor input for livestock production	Livestock category, worker type, gender
	Labor cost for livestock production	Livestock Category, worker type
4F. Livestock - Health	Livestock vaccination	Livestock Category
	Livestock parasite treatment	Livestock Category
	Livestock curative treatment	Livestock Category
	Costs related to livestock health	Livestock Category
4G. Livestock – Milk Production	CORE-AG indicators[1]	Livestock Type
4H. Livestock – Egg Production	CORE-AG indicators[1]	Livestock Type
4I. Livestock – Other Livestock Products	CORE-AG indicators[1]	Product Type
5A. Aquaculture Production	CORE-AG indicators[1]	Product Type
5B. Aquaculture Labor	Labor input for aquaculture	Worker Category
	Labor cost for aquaculture	Worker Category
6A. Fishery Production	CORE-AG indicators[1] plus:	Product Type
6B. Fishery Labor	Labor input for fishery	Worker Category
	Labor cost for fishery	Worker Category
7A. Forestry Production	CORE-AG indicators[1] plus:	Product
7B. Forestry Labor	Labor input for forestry	Worker Category
	Labor cost for forestry	Worker Category
Other Costs	Costs for other items related to agricultural production	Cost Type

[1] See Table C.1

TABLE C.3 – DATA ITEMS / INDICATORS COVERED IN ILS-HH QUESTIONNAIRE

Questionnaire Section	Data items / indicators	Unit of observation
Composite Indicators	CAADP 2.4 Household non-agricultural income	
Household Member Roster	Household size	Household
	Population demographics: gender, age, marital status	Individual[1]
	Training in agriculture	Individual[1]
Education	Literacy (rate)	Individual[1]
	Net enrolment rate, gross enrolment rate	Household; gender, age
	Highest level of education achieved	Individual[1]
Labor and time use	Labor force participation, Employment, Unemployment[2]	Individual[1]
	Barriers to employment, steps taken to obtain employment	Individual[1]
	Reasons for inactivity	Individual[1]
	Industry of main job	Individual[1]
	Type of occupation	Individual[1]
	Time spent on first and second job	Individual[1]
	Total income from and wage rate in first and second job	Individual[1]
	Time used for non-employment activities: household goods, water collection, fuel and firewood collection, childcare, cooking and meal preparation.	Individual[1]
Financial Access	Existence of personal savings	Individual[1]

	Access to mobile money	Individual[1]
	Turned down from obtaining credit	Individual[1]
Housing Conditions	Dwelling/property tenure	Individual[1]
	Tenure rights, security of tenure	Household
	Characteristics of the dwelling: walls, roof, floor materials; number of rooms	Household
	Sources of energy/electricity	Household
	Main drinking water source (improved/unimproved; quality)[3]	Household
	Time to collect drinking water[3]	Household
	Sanitation facility (improved/unimproved)[3]	Household
	Access to internet	Household
	Access to mobile phone	Household
Household Enterprises	Non-agricultural enterprises by sector of enterprise	Household
	Enterprise ownership	Individual[1]
	Record keeping of enterprise	Enterprise
	Age of enterprise	Enterprise
	Seasonality of enterprise activity, revenue	Enterprise
	Household and non-household workers employed in enterprise	Enterprise, Individual[1]
	Sales and revenue	Enterprise
	Size of enterprise (by revenue, number of workers)	Enterprise
	Enterprise expenditures	Enterprise
	Enterprise profits/household income from enterprise	Enterprise
	Control and use of enterprise profits	Individual[1]
Other Income	Household income from remittances and other transfers	Income source
	Household income from pension and investments	Income source
	Household rental income	Income source
	Household revenue from sales of assets	Income source
	Control over and use of income	Individual[1]
Asset Ownership	Household assets	Asset type
	Individual ownership of assets	Asset type, individual
Shocks and Coping Strategies	Household experience of shocks	Type of shock
	Effect of shocks on income, assets, food production, stocks, and purchases	Type of shock
	Responses to shocks/coping strategies	Type of shock
Food	Food groups consumed by the household in the past 7 days	Food group
	WFP Food Consumption Score	Household
	Food Insecurity Experience Scale (FIES)	Household
Land Tenure	Land tenure questions corresponding to SDG indicators 5.a.1 and 1.4.2	Parcel
	Farmer-reported parcel area	Parcel
	Main uses of parcel	Parcel
	Parcel rental payments	Parcel
	CAADP 3.1VI	Parcel

[1] Individual-level data also allows for gender and age disaggregation.

[2] In line with ILO definitions.

[3] In line with UNICEF *Core questions on water, sanitation and hygiene for household surveys.*

TABLE C.4 – DATA ITEMS / INDICATORS COVERED IN PME-AG QUESTIONNAIRE

Questionnaire Sections	Data items / indicators	Unit of observation
Composite indicators	CORE-AG indicators[1] plus SDG 2.4.1	
0.B Holding Identification	CORE-AG indicators[1]	Holding
0.C. Roster and Education of Household Members	CORE-AG indicators[1]	Holding
0D. Agricultural Activities	CORE-AG indicators[1] plus:	Holding
	Profitability	Holding
1. Agricultural Parcel Roster and Details	CORE-AG indicators[1] plus:	Parcel
	Land tenure	Parcel
2. Plot Roster and Details	CORE-AG indicators[1]	Parcel-Plot
	Tillage	Parcel-Plot
	Intercropping cover	Parcel-Plot
	Irrigation type and area	Parcel-Plot
	Pure stand or mixed cropping	Parcel-Plot
3. Crop Roster	CORE-AG indicators[1] plus:	Parcel-Plot-Crop
	Crop residues treatment	Parcel-Plot-Crop
4. Seed Use and Acquisition	CORE-AG indicators[1] plus:	Crop
	Seed type and source	Crop
5. Land Use	CORE-AG indicators[1]	Holding
1A. Temporary Crop Production	CORE-AG indicators[1] plus:	Parcel-Plot-Crop
	Area with use of plant protection, irrigation	Crop
1B. Temporary Crop Destination	CORE-AG indicators[1]	Crop
2A. Tree & Permanent Crop Production	CORE-AG indicators[1] plus:	Parcel-Plot-Crop
	Number of trees and density	Parcel-Plot-Crop
	Use of fertilizer	Parcel-Plot-Crop
	Use of plant protection and area of use	Parcel-Plot-Crop
2B. Tree & Permanent Crop Destination	CORE-AG indicators[1] plus:	Crop
3A. Processing crop production	Quantity, value of sales	Products
	Responsible for decisions	Products
3B. By-products	Quantity and price	Product
4A. Input roster	CORE-AG indicators[1] plus:	Input type
	Toxicity level of pesticides	Input type
5A. Livestock - Ownership	CORE-AG indicators[1]	Livestock Type
5B. Livestock practices	Reproduction techniques	Holding
	Veterinarian services	Holding
	Use of hormones, antimicrobials, antibiotics and traditional medicines	Holding
	Animal housing system and characteristics	Holding
	Animal transportation methods, frequency and finality	Holding
	Animal feeding and watering	Holding
5C. Livestock – Change in Stock (Ruminants)	CORE-AG indicators[1]	Livestock Type
5D. Livestock – Change in Stock (Poultry)	CORE-AG indicators[1]	Livestock Type
5E. Livestock – Milk Production	CORE-AG indicators[1]	Product Type
5F. Livestock – Egg Production	CORE-AG indicators[1]	Livestock Type

5G. Livestock – Other Livestock Products	CORE-AG indicators[1]	Product
6. Aquaculture Production	CORE-AG indicators[1]	Product Type
7. Fishery Production	CORE-AG indicators[1]	Product Type
8. Forestry Production	CORE-AG indicators[1]	Product
9. Labor	CORE-AG indicators[1] plus:	Worker category
	Daily worker rate	
10. Use of Natural Resources	Energy sources	Holding
	Soil management: natural vegetation, land coverage, crop rotation, practices, soil analysis, soils changes	Holding
	Irrigation: equipment, system and methods, irrigated area, water sources and payment	Holding
11. Livestock Production Methods	Animal breeding and reproduction services	Holding
	Animal housing	Holding
	Equipment and transportation of animals	Holding
	Feed and use of pastures	Holding
	Watering of animals	Holding
	Manure production, sales, use and quantity	Holding
12. Organic Farming	Conversion and certification (crops and livestock)	Holding
13. Agroforestry	Type and area	Holding
14. Information Services, Infrastructure, and Communal Resources	Information type, sources, and media	Holding
	Extension services	Holding
	Access and use of communal grazing land, forest and wooded land, water for aquaculture, and irrigation	Holding
15. Greenhouse Gas and Environment Issues	Protect areas	Holding
	Sustainable forest management	Holding
	Contaminated sites	Holding
	Environment protection programs and organizations involvement	Holding
	Environment concerns	Holding
	Fines for environmental pollution	Holding
16. Adaptation to Climate Changes and Mitigation Strategies	Natural extreme events and disasters	Holding
	Human, economic, physical	Holding
	Practices to adapt to climate change	Holding
17. Waste Management	Wastewater production and management	Holding
	Other waste production and management	Holding
18. Shocks	Occurrence and severity	Shock type
	Mechanisms for protection against external shocks	Holding
19. Food Security	Food Insecurity Experience Scale	Household

[1] See Table C.1

TABLE C.5 – DATA ITEMS / INDICATORS COVERED IN MEA-AG QUESTIONNAIRE

Questionnaire Sections	Data items / indicators	Unit of observation
Composite indicators	CORE-AG indicators[1]	
1A. Temporary Crop Production	CORE-AG indicators[1]	Parcel-Plot-Crop
1B. Temporary Crop Destination	CORE-AG indicators[1] plus:	Crop
	Selling responsible	Crop
	Commercial network	Product
	Time to reach the market	Product
	Selling Frequency	Product

2A. Tree & Permanent Crop Production	CORE-AG indicators[1]	Parcel-Plot-Crop
2B. Tree & Permanent Crop Destination	CORE-AG indicators[1] plus:	Crop
	Selling responsible	Crop
	Commercial network	Product
	Time to reach the market	Product
	Selling Frequency	Product
3C. Input Use & Acquisition	CORE-AG indicators[1]	Input type
4. Non-Residential Building for Crops	Type and capacity	Building type
	Use and Tenure	Building type
5A. Livestock - Ownership	CORE-AG indicators[1] plus:	Livestock Type
	Control over and responsibility for raising livestock	Individual
	Selling responsible	Livestock type
	Commercial network	Livestock type
	Time to reach the market	Livestock type
	Selling Frequency	Livestock type
5B. Livestock – Change in Stock (Ruminants)	CORE-AG indicators[1]	Livestock Type
5C. Livestock – Change in Stock (Poultry)	CORE-AG indicators[1]	Livestock Type
5D. Livestock – Milk Production ***5H. Livestock – Egg Production*** ***5I. Livestock – Other Livestock Products***	CORE-AG indicators[1] plus:	Product Type
	Commercial network	Product Type
	Time to reach the market	Product Type
	Selling Frequency	Product Type
6. Non-Residential Building for Livestock	Use and tenure	Building type
7. Machinery and Equipment	Use and quantity	Input item
	Ownership and right to use	Input item
8. Aquaculture Production	CORE-AG indicators[1]	Product Type
9. Fishery Production	CORE-AG indicators[1]	Product Type
10. Forestry Production	CORE-AG indicators[1]	Product
11. Labor	Agricultural labor input per activity	Worker category
12. Services	Transportation coverage and time	Modal
	Access to processing facility	
	Communications services access and use	
	Access to repair facilities	

[1] See Table C.1

Appendix II: Guidance on GPS-Based Area Measurement

This appendix may be used to guide enumerators in the measurement of the area of parcels and/or plots. The instructions included below are based on the use of the Garmin eTrex 30 device, although they can be adapted to fit other devices as needed.

A GPS uses the information from satellites to find the geographical position on the Earth's surface by longitude and latitude. The position is found by a continuous measurement of the time a satellite signal takes to reach the GPS device from a satellite. With clear signals from at least four satellites, the GPS is able to calculate the geographical position. The more sky that a GPS device can see, the more signals and clearer signals it can receive. Shadows of buildings and even large trees should be avoided while using a GPS device in the parcel.

Device Overview

①	Zoom keys
②	Back key
③	Thumb Stick™
④	Menu key
⑤	⏻/Backlight key

⑥	Mini-USB port (under weather cap)
⑦	Battery cover
⑧	Battery cover locking ring
⑨	Mounting spine

Using the eTrex Keys

- Move the Thumb Stick up, down, left, and right to highlight menu selections or to move around the map.
- Press the center of the Thumb Stick to select the highlighted item.
- Press **back** to move back one step in the menu structure.
- Press **menu** to display a list of commonly-used functions for the current page. Press **menu** twice to access the main menu from any page.
- Press ▲ and ▼ to zoom in and out on the map.

BEFORE calculating the area with the GPS:

1) Complete all other sections of the questionnaire, ensuring the respondent's estimate of area has been provided before beginning the GPS measurement.

2) Walk around the parcel/plot with the respondent in order to determine the boundaries. Clear any obstacles that may block your path, so that you have a clear, unobstructed path around the boundary of the parcel/plot.

3) Mark your **starting point** with a stick or other object so you can identify the point when you return. The starting point should be the northwest corner of the parcel/plot, or other location determined at the country level, to ensure consistency in measurements.

4) Wait for the device to fix on **at least four** satellites.

5) To preserve the battery, set the backlighting on the GPS as low as possible. To do this, do the following:
   a) While the device is on, click the power button once (do not hold it).

b) Move the Thumb Stick to the left to decrease the backlighting. You should decrease the backlight as much as possible in order to save the batteries.
c) Exit this page by pressing the BACK button.

Procedure for Area Measurement Using GPS:

1) Proceed to the northwest corner of the parcel/plot (or other predetermined starting point determined at the country level) where you have marked it with a stick.

2) Turn on the GPS device by holding the power button until an image appears on screen. The GPS device will then seek to acquire satellite signals. This may take up to three minutes. From the main menu, navigate to highlight SATELLITE and press the Thumb Stick. The green and blue bars at the bottom of the screen show the satellites that have been found. Wait until **at least four satellites** have been acquired.

    a. On the left side, you will see the GPS accuracy in meters. This number will fluctuate as satellites are acquired. **Wait until this number is steady before moving on.**

3) Press the MENU button twice to return to the main menu. You may also push the BACK button repeatedly until you arrive at the main menu. Select the AREA CALCULATION page by highlighting and clicking the center of the Thumb Stick.

4) START will appear on the screen. When you are ready to begin, click the Thumb Stick. Now the GPS device has started recording the track. You will see CALCULATE on the screen (NOTE: do NOT click this until you are finished).

5) Walk slowly clockwise around the perimeter of the parcel. You should hold the GPS device flat in your hand and stretch your hand slightly forward. You MUST walk on the edge of the parcel (NOT a meter outside the parcel). At every corner, you MUST pause for five seconds (counting slowly 1001, 1002, 1003, 1004, and 1005) and then continue walking. You MUST walk all the way around the parcel until you have returned to the location of the starting stick, with the GPS device facing the direction in which it started the area calculation.

6) When you reach the starting stick, CALCULATE should still be seen on the screen. Click CALCULATE by pressing the Thumb Stick. The GPS device will display the area measurement directly in SQUARE METERS. You should then record the results with TWO decimals. If the area is not displayed, it means you have not clicked the Thumb Stick straight. You must press the back button until you see CALCULATE on the screen and then press the Thumb Stick again.

7) Save the track you have just recorded by highlighting SAVE TRACK and pressing the Thumb Stick. **Delete the default track name and enter the name as "HHID-Parcel ID" or "HHID-Parcel ID-Plot ID"**. For example, if the HHID is 31403 and the Parcel ID is 2, enter the track name as 31403-2. Highlight DONE and press the Thumb Stick. Never erase saved tracks.

8) To review the track, view the outline on the map, or determine the distance of the perimeter, return to the main menu and navigate to the TRACK MANAGER. Press the Thumb Stick. Highlight the track you would like to review and press the Thumb Stick. From there, select VIEW MAP. This will show you the length of the perimeter in meters (called "distance").

9) Turn off the GPS device by holding the power button.

Appendix III: Reference Questionnaires

A. CORE-AG Post-Planting

B. CORE-AG Post-Harvest: Seasonal and Annual Sections

C. CORE-AG Minor Season

D. CORE-AG Non-Household Sector

E. CORE-AG One-Visit

F. ILP-AG Post-Planting

G. ILP-AG Post-Harvest: Seasonal and Annual Sections

H. ILP-AG Minor Season

I. ILP-AG Non-Household Sector

J. ILS-HH

K. PME-AG

L. Optional Crop Cutting

M. Optional Input Use

N. Optional Labor Input

O. Optional Livestock Labor