



DIASCA

Digital Integration of Agricultural
Supply Chains Alliance

Farmer Income & Cost of Production Indicator and Methods Guidance

Phase 1 & 2: Semantics and Syntax



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1. Overview

The purpose of the Farmer Income & Costs of Production Working Group is to convene the public and private sector to create common guidance regarding metrics and protocols to measure farm and household income. This work pulls heavily from collaborations between COSA and SFL, ISEAL, GCP, ICO, KIT and LICOP, among others (see 'Appendix 1: List of Resources.') and the learnings from the many private sector partnerships of which COSA has been part. The overarching goals of this collaboration are:

1. Define indicators, tools and methods for data collection
2. Convene an expert panel to review and validate indicators, tools, and methods
3. Presentation of the finalized tools to be adopted by relevant stakeholders

2. Introduction to Metrics (Semantics)

The first component of this working group was focused on Indicators and Metrics at the household level. This is not a new set of metrics, but a consolidated set of guidelines for gathering data on commonly accepted farm actual income and cost of production metrics. Our purpose is to:

1. Align as closely as possible around metric guidance, which includes both definitions and instructions on data collection and reporting.
2. Enable shared learning about producer incomes, cost of production, and other key economic themes across companies, projects and investments by having standardized reporting guidelines.
3. To exchange best practices and shared resources for data collection and reporting and facilitate learning with public and private partners.

This document breaks down the key metrics related to measuring household income, with an emphasis on the contribution of focus crop/ product profitability as well as productivity. Examining net income of the focus crop/ product sheds light on the overall economic viability of the farm, including whether revenue offsets costs. We include production metrics to understand farm efficiencies related to costs and inputs and also to help examine the effects of investments on farm output. The following metrics will be detailed:

Key Farmer Income & Cost of Production Metrics

Land area allocated to focus crop/ livestock farming

Focus crop/ product yield

Focus crop/ product price

Focus crop/ product revenue

Focus crop/ product costs of production

Net Income from the focus crop/ product

Net Income from other on-farm activities

Net Income from off-farm activities

Note: These indicators and guidelines assume that we are looking at systems with a focus crop or product — a crop or product that is usually grown/ produced for formal (export or urban) markets. This emphasis on a single crop/ product—the crop/ product that usually holds the most economic significance—is critical to the approach on metrics like yield and prices.

These guidelines are generalized to be used with any focus crop or product (coffee, cocoa, sugar, wheat, cotton, dairy, meat products, eggs, etc.). Any secondary crops or livestock products the farmer produces are considered in a separate metric: 'Net income from other on-farm activities.'

If the farming systems being examined do not produce a focus crop/ product for formal markets (i.e., primarily produce crops for informal local markets and/or consumption), additional guidance will be needed. COSA has developed additional indicators and a data collection approach for these situations in particular that are not currently included in this scope of work.

Note on Scope

The metrics and guidance outlined in this document refer to actual income and costs of production at the household level only and do not address the related, but different, indicators and metrics on Living Income, Poverty Status, and Livelihoods. Actual income is a building block of those additional concepts, which the working group may choose to address at a later date. Resources on the following concepts can be found in the Appendix 1, but for context:

1. **Living Income** - refers to households affording a decent standard of living. The net annual income of a household, which comes from a variety of sources, is sufficient to cover the cost of a decent standard of living for a typical household in a particular place. Elements of a basic decent standard of living include access to food, water, housing, education, healthcare, transport, clothing, and other essential needs including provision for unexpected events
2. **Poverty Status** - is represented by a ratio of: 1) farming households whose income falls below the established poverty benchmarks to 2) the farming households meeting or above the poverty benchmarks. The poverty benchmarks are established for each context and can consist of an International Poverty Line (World Bank), National Poverty

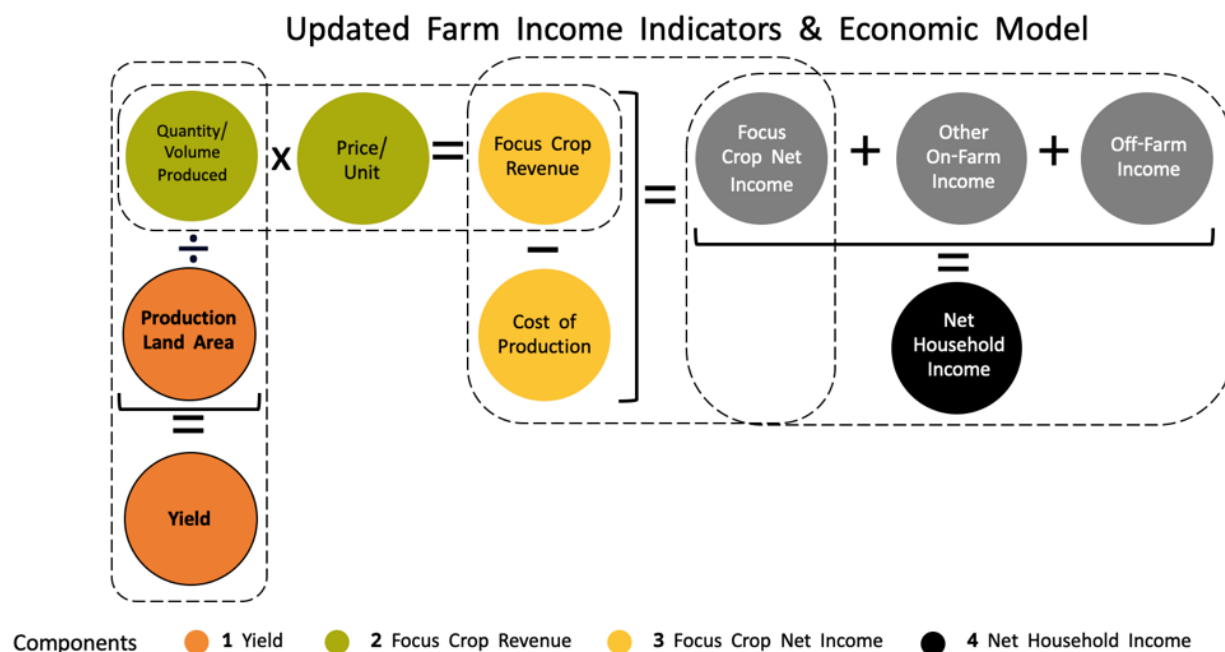
Line (if available), etc. for a given location. To identify the households below the poverty benchmark, this indicator measures the difference between a farming household's net income per person per day, and the net income per person per day determined by the poverty benchmark.

3. **Livelihoods** - A broader concept with less formal agreement on the specifics of its definition. A person's livelihood is considered sustainable when it can cope with and recover from shocks and grow assets both now and in the future, while not undermining natural resource bases.

Creating a Farm Economic Model

A common framework and approach for farm economic metrics is essential to facilitate consistent and standardized reporting. The below Farm Economic Model (Figure 1) represents the individual household economic metrics outlined in the Metrics section of this document and how they are used together to calculate household net income.

Figure 1. Farm Economic Model



This model includes some simplifications for ease of use that are further expounded in the detailed indicator descriptions below. For example, the model assumes that the focus crop or product amount produced on a farm is the same as the amount sold to simplify the yield and revenue calculations. The guidance in the below sections on both Yield and Revenue provides more nuanced instructions in situations where this is not always the case.

Regardless, farm economic models can be useful for tracking changes in the net incomes of farmers over time or to monitor changes in income as related to program activities. To evaluate whether farming households are earning enough for a decent standard of living

(i.e., a living income), one could use this model and compare the net household income to a living income benchmark. Some poverty benchmarks (World Bank, National poverty lines, etc.) may refer to the amount of income per person in a household. For that purpose, we define household members as: number of people, regardless of relationship, who normally (for at least 6 consecutive or non-consecutive months of the year) live in a particular residence, occupying it wholly or partially, and who together fulfill their nutritional needs and share expenses from a common pot.

Note that one metric that is outside the full scope of this current document is the “net income value of self- consumed crops and livestock.” While this document does provide some initial guidance on this topic, we do not present a complete methodology for it here. It is important to understand that in some systems (typically smallholder) the value of agricultural or livestock products that are self-consumed or traded for items other than money is important to get a complete picture of a household’s net income. There are several methods that can be used to do this (at various levels of complexity) that require separate guidance in order to be useful. COSA has done considerable work in this area, and we also include a couple of resources below for further guidance:

- [The Household Economy Approach: A resource manual for practitioners¹](#)
- [Measuring Livelihoods and Environmental Dependence: Methods for Research and Fieldwork²](#)

Placing Household Income Metrics in Context

Economic factors of sustainability are crucial to understanding farmer livelihoods and poverty levels in smallholder agricultural systems. While this document focuses exclusively on metrics to build a farm economic model, it is important to note that sustainability, by definition, necessitates balancing social, environmental and economic factors.

We recognize that there is a tendency to oversimplify sustainability by prioritizing economic factors, like increased yields or incomes. While these aspects are critical, if a multi-dimensional view is not considered, there is a risk of missing factors vital to the success of projects, investments, and reputation. For example, if yields are increased by clear-cutting a forest, which results in soil erosion and silted waterways, this is not a sustainable outcome. Improving incomes may benefit the farming household as a whole, but income and expenditures may not be equitably controlled or distributed among household members, especially women. This can be problematic for projects or investments whose focus is limited to one or two desired outcomes. Economic metrics should therefore be both understood and interpreted in a broader social and environmental context. Users can reference the [ISEAL’s Common Core Indicators &](#)

¹ https://resourcecentre.savethechildren.net/pdf/the_household_economy_approach.pdf/

² <https://www.cifor.org/knowledge/publication/3341/>

[Performance Metrics for Key Sustainability Issues](#)³ or the [COSA Indicators](#)⁴ and resources for approaches to measure the multi-dimensionality of sustainability. Other sets of crop/product or sustainability issue focus indicators also exist by industry or theme.

3. Introduction to Methods (Syntax)

The second phase of this work was to align methodological pathways and principles to ensure that the data collection approach is consistent for global comparability and learning at scale. These methodological considerations will be essential for building the Structural (Phase Three) component of this work that details data structure requirements and data formats.

There are many ways that data can be collected to inform the actual income and cost of production indicators. While there are tradeoffs in terms of data accuracy, cost and rigor of different approaches, the selected methodology should be documented to facilitate accurate comparisons and analysis.

The methodological guidelines are as follows:

1. Data Sources

What follows in this section is general guidance to help organizations collect good quality data for individual contexts. There are several options for data collection, with varying levels of accuracy and rigor.

On one end of the spectrum, highly rigorous scientific data is typically achieved through Impact Assessment approaches where outside (i.e., third party) researchers or trained enumerators collect detailed data directly from farms/farm households using advanced sampling methods (control groups, stratification, etc.). While highly accurate and credible, these methods can be costly and time consuming to deploy.

Performance Monitoring approaches, on the other hand, typically substitute less rigorous methods (using field staff or other associated surveyors, rougher field sampling methods, etc.) to collect data as a management tool to inform operations with a lower cost and effort. While Performance Monitoring approaches sacrifice part of the accuracy and credibility of Impact Assessment methodologies, it is designed more as a knowledge management system that provides good enough information for day-to-day decision making and to manage costs across multiple projects or supply chains.

As data collection tools and technologies advance, self-reported and voluntary data—which have their own credibility limitations—are becoming a more viable option for capturing good quality data from producers, under certain conditions. This is especially true as

³ <https://www.isealalliance.org/about-iseal/our-work/common-core-indicators#:~:text=The%20ISEAL%20Common%20Core%20Indicators,monitor%20performance%2C%20and%20assess%20impact.>

⁴ <https://thecosa.org/master-list>

improvements in data collection have evolved to capture ongoing and regular data about farm operations in real time and at low cost, providing the opportunity for highly detailed and more accurate information throughout the production year. Of course, the quality of self-reported and voluntary data should be considered; good quality data collection will deploy verification and validation protocols (e.g., third party data checks, surveys that cross-check responses, and methods to pick up potential respondent bias). Agile data approaches and technologies are still a growing field of study. Topics like social desirability bias and how different modes of data collection affect results are an emerging area of inquiry that should be considered if deploying self-reporting or voluntary protocols.

This work is not be prescriptive about which data collection options or methods may or may not be deployed. Rather, this document will lay out the best practice considerations for different methodological decisions, which organizations can use to select and document their choices consistently. Further guidance on data source options for *individual indicators* is documented in Section 6. Actual Income and Cost of Production Indicators/Metrics in the table under “Data Source.” In general, data source options range from farmer estimates and recall, to documented records, and GPS mapping among other options. Organizations reporting data will be responsible for documenting data sources used for each indicator as well as general information about the dataset (country, sampling strategy deployed, cropping system, etc.). This can be seen in Section 4. Context and Farmer Characteristic Data.

Note on Primary & Secondary Data- Primary data sources include self-reported data, supply chain reports, compliance assessments, and program reporting from local technicians. Secondary data (e.g., from public sources, international databases, national surveys, certifications), can be a reasonable substitute in some cases or to add additional understanding and contextualization of the collected data to enrich analysis, but should align with the same metrics and come from a credible source to be fairly included. A credible source would refer to those sources that utilize and document best practices in outcome or impact reporting (e.g., representative sampling, third party surveyors, etc.) and should also refer to the year the data covers to be considered.⁵

2. Sampling & Field Data Collection Guidance

Sampling - Where field data collection is being deployed, sampling of producers is a way to ensure collected data is representative of a population without surveying all producers in a supply chain, project, or region. A good sampling design is always representative of the target population or producers, supply chains, and communities that undergo an intervention or take part in a program. We can differentiate between Monitoring and

⁵ LICOP has further instructions for best practice in how to use secondary data sources in income calculations: “Estimating farmer household income: How to use secondary data to estimate farmer household income illustrated by two specific use case scenarios” (2020). <https://www.impactinstitute.com/portfolio/living-income/>

Impact Evaluation designs. The former seeks to be able to provide an estimate of specific characteristics and outcomes for the population under study (e.g., yields, use of inputs, production costs). The latter seeks to identify the effect of a particular intervention with higher levels of confidence and to better discern causal differences such as attribution or contribution. Hybrid approaches that mix both Monitoring and Impact Evaluation content and methods can also be considered.

Appendix 2 offers Simple Guidelines for deploying a sampling strategy in Performance Monitoring contexts. Impact Assessment methodologies are of course welcome, although the technical considerations are more rigorous. We therefore recommend working with a research partner to guide those processes, especially when considering that different contexts would require different approaches to sampling.

Note on use of Audit Data: Some cost or revenue indicator data may be covered in audits or through other compliance inquiries. If an entity wishes to use that data to report on the indicator framework, please be aware of the following:

- a. Compliance and audit data are usually collected on a much smaller sample of farmers than typical monitoring approaches (audit sampling typically relies on square root sampling instead of a large enough population to ensure statistically sound results). This means that audit data may not be representative of the whole population.
- b. Compliance data often gives the user a binary result on a single topic, i.e., whether a certain condition was met or not. It does not usually convey the degree to which a certain condition was met, nor can it be used to see incremental change over time (although we note shifts towards performance-type indicators and “degrees of compliance” becoming more standard in some instances). Therefore, to achieve more control over the supply chain and improve the ability to remedy significant issues, it is strongly recommended to use the SMART indicator approaches like those detailed for each indicator below (in fact, the approaches below could be built into an organization’s compliance assessment tools).

Data Quality - Ensuring the quality of the data is a critical function and can be done with an appropriately and relatively simple mix of validation and verification tools that are not difficult to engage. Where surveys are deployed, those that rely on multiple choice and scaled questions enhance data quality (as compared to open-ended questions). When survey software is used (instead of paper surveys), this has the advantage of enabling skip logic and built-in validations which reduce input errors and increase the accuracy of results while substantially reducing the time required for data cleaning and analysis. For example:

1. Threshold validations are applied to the project to identify if a given response falls outside of the reasonable range (e.g., checking that farmer reported yields fall between the lower and upper quantities per area and quantities per plant fall into the plausible range for project area)

2. Logical validations that check for internal consistency of answers (e.g., the total farm area is asked of the producer and then the amount under each different set of land uses; the sum of the different land uses should equal the total farm area).

Surveyor training is also a vital component of the data quality process—when surveyors are trained on the question content and approaches, data quality improves dramatically. Test surveys with actual producers and debriefing with survey design teams afterward also improve results considerably.

Data Cleaning -- Thoughtful and well-adapted surveys, using real-time validations, and the training and monitoring of surveyors all contribute to accurate data. But there will always be a need to clean the data before performing the analysis. While too extensive to detail in this basic document, the core guidelines are:

1. Ensure that all the questions asked in the survey appear in the dataset.
2. Check that missing values result from skipped responses and should not be a value of zero, and vice versa.
3. Perform simple outlier analyses, especially on key variables such as farm area, production, trees or plants, labor days, etc., as outliers can significantly affect results.
4. Ensure data makes sense (e.g, total focus crop area is not bigger than total farm area)
5. Document all cleaning choices and tag data appropriately.

It is important to remain in close contact with field managers, surveyors, and others involved in the data collection process who have valuable contextual knowledge of why questions were answered a certain way. Even within the same country, regional or cultural differences may cause producers to understand or report questions differently.

3. Context & Conversions

Contextual information is important for understanding the data in light of factors such as gender, different cropping systems, young adult producers, smallholder status, etc. Reporting these factors in addition to the actual income and cost of production data points will allow the disaggregation of the results on those bases to provide deeper insights.

Conversions -- While collecting data in local units and measures provides the best results, it is important to have documented all conversion factors (including local forms of the product sold, land area units, weights and measures of sales quantity/volumes, currency⁶, etc.) so that results can be converted to standard international units (special attention should be given even within countries where standard units may differ by region). Each indicator below is detailed in its standard international unit.

⁶ Exchange rate resource for currency conversions to USD: <https://data.worldbank.org/indicator/PA.NUS.FCRF>

4. Context and Farmer Characteristic Data

The following fields help place the income and cost data in context and for disaggregation around socio-economic factors at the producer level.

Context Data

Information that describes the project and supply chain characteristics.

Organization/ Supply Chain Providing Data	Name of the project, supply chain, or partner providing data
Country	Country of producers in project or supply chain
Study population description	(i.e., part of program, general sourcing area, etc.)
Cropping system	List the focus crop
Number of producers in project or supply chain (#)	Total number of producers in the population being examined
Sample Size (#)	Total number of producers sampled, if applicable. Sampling method (e.g., cluster sampling, stratified sampling, etc.)
Production Year	The dates of the last production year (in month/year format). Refers to the end of the last harvest to the end of the corresponding harvest before that.

Farmer Characteristics

Information about each producer for disaggregation purposes. We suggest Gender and Year of Birth as a minimum to understand women and young adult participation in production systems. However, where available, other socioeconomic data can be useful.

Gender	Whether the producer is male, female, or other
Year of birth	Year of birth determines age, which can be used to assess next generation participation and young adult engagement in production systems
Minority status	If there are minority groups that are important in the supply chain or project, they can be identified here (e.g., migrants, indigenous communities, etc.)
Smallholder status	Whether the producer is a smallholder (operating on less than 5 has of farm area)
Poverty status	Whether the producer is classified as being in poverty (through World Bank Poverty Line, National Poverty Lines etc.).
State/Department	Geographic unit below the country level for understanding regional differences in results within countries. Note that to protect producer identities, we will not detail collecting data at geographic units smaller than state or department levels, or GPS coordinates, although this level of geographic detail is recommended for individual supply chains and projects.

5. Indicator/Metric Table Overview

The individual farm-level metrics used to calculate farm productivity, actual income and cost of production will be displayed in a table with the following fields detailed:

General Indicator/ Metric Structure

Indicator Name	Name of the indicator
Description	Explanation of the indicator in context
Metric	Indicator measurement
Unit	Standard unit for measurement
General Guidance	Guidance on how to measure the metric. The guidance highlights differences between approaches in performance monitoring and more in-depth studies, as well as tips on where common measurement errors occur.
Benchmarking	Alignment with other standards, norms or commonly accepted resources on this topic.
Performance Standard	Where feasible, instruction on how to interpret positive or negative performance on an indicator. Is often related to regional or crop/ product specific contexts.
Limitations	Shortcomings of the indicator as defined and considerations for improving reporting.
Calculation	How the metric is calculated using the specified data points collected.
Data Source	Source of data used to inform the indicator (e.g., farmer recall, activity or procurement records, etc.).
Survey Questions	The simple set of questions (Monitoring approach) that can be used with producers to collect the necessary data points on an indicator.
Validations	Instructions and guidance for ensuring data quality.

6. Actual Income and Cost of Production Indicators/Metrics

Indicator 1: Land area allocated to Focus Crop/ Product

Description	<p>Total Farm size refers to total property size, including land used to grow crops, pasture, wooded areas, land covered by buildings, and any other area included in the property.</p> <p>Total farm size for focus crop/ livestock farming is the subsection of the total farm size that is dedicated to the focus crop/ livestock farming.</p> <p>Note: Although land area is not used to define livestock farming productivity, the number of animals per area is important to assess carrying capacity and animal welfare.</p>
Metric	<p>Total farm size: Total area of the farm (ha) (also broken down by each type of crop or livestock use)</p> <p>Total focus crop/livestock farming area: Total area under focus crop/ livestock farming (ha) and (if relevant) can be broken down by individual plots and/or area that is productive, renovated, rehabilitated, or left to rest/ rotational grazing.</p>
Unit	Best practice is to collect response in locally relevant units, and then perform conversion to a standard international unit (ha)
General Guidance	<p>The farm area is the total land area that ANY household member either (i) owns (with or without ownership title), (ii) has rights to use (possession, assigned communal land, land reform titles, etc.), (iii) has any land-use arrangement with third parties (loans, rentals), (iv) uses as a sharecropper.</p> <p>It is ok to rely on farmer recall although more rigorous estimates will include GPS or polygonal mapping data (this is especially important for compliance with emerging EUDR legislation). Consider that farms may contain multiple plots (plots are farm land areas that are not connected, or farm areas that are managed differently, or both). Make sure to add all relevant plots managed by members of a household together (that is, the farm area should coincide with the land</p>

	<p>used to account for the farm cost and revenue data being reported).</p> <p>Note that in tree cropping systems, a reasonable proxy for land area measurements is to estimate land area based on numbers of trees grown and known planting densities. At the very least, it can be good to triangulate farm land area reported with number of trees and tree density rates to ensure consistency of results. Therefore, number of trees and planting density figures can be used to estimate land area if local ranges are known and reliable, and this data can be used to estimate or corroborate reported land area.</p> <p>Intercropped systems (those where other plants are cropped in between or around the focus crop) should not affect the land area reported for the focus crop. In some cropping systems, focus crop land area may include areas that have been rehabilitated or renovated, which may be significant. While the total area under the focus crop production includes both rehabilitated and renovated areas, questions are detailed below for systems where this may be significant and may affect production figures.</p>
Benchmarking	<p>SDG 1: End Poverty, target 1.4</p> <p>GCP common indicators</p> <p>COSA-ICO Cost of production indicators</p>
Performance Standard	<p>Will depend on cropping/production system and regional context</p>
Limitations	<p>Farmers may not always know the precise area dedicated for focus crop/ livestock farming. This may affect the accuracy of calculations for other indicators such as yield, economic efficiencies, etc.</p> <p>Getting accurate plot size measurements can be challenging in smallholder production systems especially for a number of reasons (irregular plot sizes, different tenure and ownership arrangements, multiple traditional parcels, and steep slopes and/or heavy tree cover that makes it difficult to take physical measurements). There are a number of techniques to get accurate results from farmer recall, triangulating data with other sources (for example, plant or animal density rates) and GPS measurements in some cases when practical and affordable. (Note that pending EUDR regulations in some</p>

	crops—soy, beef, palm oil, wood, cocoa, coffee and rubber—require geographic coordinates of the plots of land where commodities are produced). However, calculating land areas dedicated to agricultural and livestock farming in a simple and cost-efficient way still remains an active topic of discussion in the sustainability measurement community.
Calculation	Total focus crop/livestock farming area= sum of all farm areas (plots) dedicated to focus crop/product production
Data Source	Document which of the following data sources were used: Estimated/ farmer recall Farm records # of trees or plant density calculations GPS or polygon mapping
Sample Survey Questions	<ol style="list-style-type: none"> 1. What is the total area of your farm, including all crops grown, and land used for pasture if any? _____ (unit) 2. What is the total area you use for focus crop/ or livestock farming? (This includes all focus crop/ livestock plots and any land where the focus crop is interplanted/intercropped with other crops or where the focus animal shares space with other animals or products.) _____ (unit) 3. If you don't know exactly the area, about what percent of the total farm do you use for focus crop/ livestock farming? _____ % 4. How many [units] or what % of the focus crop area has been productive in the past year of production? <i>(If needed)</i> 5. How many [units] or what % of the focus crop area has been renovated in the past year of production? <i>(If needed)</i> 6. How many [units] or what % of the focus crop area has been rehabilitated in the past year of production? <i>(If needed)</i> 7. In the past year of production, how many units of the livestock farming area were designated for rotational grazing or rest periods? <i>(If needed)</i>
Validations	<p>Data validation should ensure that:</p> <ul style="list-style-type: none"> • All areas are reported in number (decimal) formats • The total area planted in the focus crop/ livestock farming should be less than the total farm size. • Area or % of focus crop area that has been productive should be less than or equal to the total focus crop area, or 0

	<ul style="list-style-type: none"> • Area or % of focus crop area that has been renovated should be less than or equal to the total focus crop area, or 0 • Area or % of focus crop area that has been rehabilitated should be less than or equal to the total focus crop area, or 0 • Area or % of livestock area left for rotational grazing or rest periods should be less than or equal to the total livestock farming area
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Indicator 2: Focus Crop/Product Yield

Description	<p>Cropping systems: Total volume target crop harvested per unit of land allocated to target crop</p> <p>Livestock systems: Quantity of meat/milk/eggs produced in standard units/ number of animals or other appropriate metrics considering the production system</p>
Metric	<p>Cropping systems: kgs of focus crop in most common form produced/ ha of focus crop productive area (or other standard unit relative to individual crops or products). In some crops, productivity measurements may also be calculated or supplemented by looking at production amounts per tree, plant, etc.</p> <p>Livestock systems: Quantity of product (e.g., meat/milk/eggs) produced /number of animals (other metrics may be appropriate in some cases, e.g., unit of weight gain per unit of feed consumed, etc.)</p>
Unit	<p>Best practice is to collect response in locally relevant units, and then perform conversion to a standard international unit (e.g., kgs of standard international form/hectare or other productivity unit)</p>
General Guidance	<p>Measuring yields is one of the most important ways that we understand agricultural/ livestock farming productivity. Many interventions in agricultural systems are designed to increase yields because: 1) yields may be below potential and 2) it offers a channel to improve the incomes of producers. Measuring yield also helps us understand production efficiencies related</p>

to inputs and it helps us examine the effects of sustainability initiatives on farm productivity.

The approach requires knowing:

1. Focus crop productive area (requires local land area unit conversion to hectares)
2. Amount harvested (requires local unit conversion to kgs or other standard unit). Amount sold can be a suitable proxy where harvested amounts are unknown (i.e., many smallholders will only know production volumes when their product is weighed at the collection site)
3. Form of focus crop/ product (will require conversion to most common form exported (i.e. GBE for coffee, FFB for palm, etc.)
4. Livestock systems require knowing the number of animals, the livestock type, the breed, the quantity of product produced by the animals (in weight, volume or number of units).
5. For livestock farming where the farmer is not selling a final product like eggs, milk or meat, calculating the feed conversion ratio (FCR) can help to provide a good idea of how productive the farm is. The FCR is the amount of feed consumed per unit of milk/ egg produced or weight gain in beef or any other livestock type production (for example, a lower FCR indicates better feed efficiency and higher productivity. $FCR = \text{Total Feed Consumed} / \text{Total Weight Gain or Product Produced}$).

Where possible, it may be desirable to capture both amount harvested and commercially sold volume to understand where there are differences between production and sales amounts.

Benchmarking

COSA, SFL, ISEAL Guidance on Reporting Farm Economic Metrics: <https://thecosa.org/iseal-sustainable-food-lab-cosa/>
SDG 2- Zero Hunger
ISEAL Common Core: Production - Yields
GCP common indicators
COSA-ICO Cost of production indicators

Performance Standard

Can be benchmarked to crop-specific and regional or national productivity averages

Limitations	<p>Amount harvested may not be known in all cases. Where unknown, amount sold can be a suitable proxy (i.e., many smallholders will only know production volumes when their product is weighed at a selling point).</p> <p>This approach also does not consider the amount of product held by producers, which can be significant for larger farms, but for smallholders is usually nominal (and when smallholders do hold crops, it is often for less than a year).</p> <p>Other factors to take into consideration to understand productivity include: age and varieties of plants/ trees/animals; level of mechanization, production intensity.</p>
Calculation	<p>Total volume focus crop harvested/ unit land allocated to focus crop (reported in kg/ha or other appropriate units). Yield can also be understood as production per tree or plant (kg/tree) in applicable crops or on a per animal basis in livestock systems (total amount of production divided by number of productive animals).</p>
Data Source	<p>Document which of the following data sources were used:</p> <p>Estimated/ farmer recall</p> <p>Farm records</p> <p>Calculation (number of trees or plants or animals x average amount harvested per plant, tree or animal)</p> <p>Company sales receipts (+ an estimate of volume sold to other buyers, if applicable)</p>
Sample Survey Questions	<p>In traditional cropping systems:</p> <ol style="list-style-type: none"> 1. What is the total area you use to produce the focus crop? (This includes all focus crop plots and any land where the focus crop is interplanted with other crops.) _____ ha 2. Write the total quantity of the focus crop harvested in the last production year _____ kg This could also be broken down by individual plots where relevant. 3. What is the total number/ volume of livestock products (eggs, milk, etc.) per animal produced per day? ____kg Meat production: 4. What is the average daily live weight gain per animal? ____ kg

Validations

Harvested volume = number (decimal format)

Area = number (decimal format)

Form and units for focus crop or product should be specified

Some systems can benefit from cross checking land area productivity with other measures (output per tree, etc.)

Indicator 3: Focus Crop/Product Price

Description	The amount received per unit of focus crop/product sold
Metric	Average price received per unit of focus crop/product-- reported in USD / kg (or other standardized unit for the relevant crop or product)
Unit	Best practice is to collect response in locally relevant currency and units, and then perform conversion to a standard international unit (USD/unit of crop or product)
General Guidance	<p>Understanding the price that a farmer receives for the focus crop/product allows us to calculate the revenue from the focus crop/product and get a sense for whether farming the crop or product is attractive and profitable. Higher sales prices incentivize production and investments in the focus crop/product. Lower prices may significantly impact livelihoods, especially where farmers are dependent on that product for a majority of their income. By collecting price data, it is possible to compare the price the farmer receives to other market information like global prices or the prices buyers receive. It also helps us understand how instruments of differentiation (quality, certifications, etc.) impact prices and overall producer incomes.</p> <p>The simple approach involves asking for the total revenue received from the focus crop/product during the last production year as well as the amount sold (and the form of the product). The average price per unit can then be calculated. For multiple sales, calculate the price average of sales.</p> <p>For a more accurate response, an alternative approach is to ask about the price received per each sale (with the associated premiums, deductions, and bonuses included, as known).</p> <p>Where price premiums or other payments are factored into the baseline or FOB price, those should be included in the price at hand and do not need to be accounted for separately. Producers often do not know if the price they receive includes premium or other values and so this information can be difficult to ascertain from producer surveys. There may also be premiums or other payments that are paid as a lump sum at a separate time during the year. If this is the case, that data</p>

	<p>should be included in <i>revenue</i> calculations to help understand the contribution of those payments to overall focus crop and household income (and should be noted as such) although this would likely be difficult to factor into the price data reported.</p> <p>As an aside, premiums, like those from FT certification, can be paid to producer organizations (POs). They can either be distributed as cash to farmers by the POs or offered as services (e.g., scholarships for farmers' children or revolving cash funds). When services are provided, it can also be challenging to incorporate them into the price data and therefore separate reporting of the value of those services is recommended outside of the price data collected.</p>
Benchmarking	<p>COSA, SFL, ISEAL Guidance on Reporting Farm Economic Metrics: https://thecosa.org/iseal-sustainable-food-lab-cosa/</p> <p>SDG 2- Zero Hunger</p> <p>ISEAL Common Core: Business Resilience- Lowest and highest price (per kg) received for product</p> <p>GCP Common indicators</p> <p>COSA-ICO Cost of production indicators</p>
Performance Standard	<p>Can be benchmarked to the global reference price (i.e., ICO, ICCO for coffee) or by regional or national averages</p> <p>Price should be higher than the cost of production to indicate focus product farming profitability</p>
Limitations	<p>In some cases, the producer may not know if premium, bonus or deduction amounts are included in the price received and what those amounts are, although they may affect the price the farmer receives. See 'General Guidance' for instructions on how to factor these payments into price data, where applicable.</p>
Calculation	<p>Price/unit= Total focus crop or product revenue /(units) of (form) sold</p>
Data Source	<p>Document which of the following data sources were used:</p> <p>Estimated/ farmer recall</p> <p>Farm records</p> <p>Sales records or purchase records from buyer</p>
Sample Survey Questions	<p>Simple Approach:</p> <p>1. Write the total quantity of the focus crop/ product sold during the last production year _____ kg (will include relevant</p>

forms if necessary--e.g., in coffee systems producers may sell green beans, fresh cherries, etc.)

2. How much money did you receive (in total for the production year) from sales of the focus crop/ product?

Complete Approach:

Ask for the price received per sale (if known) and average across sales.

Validations

Revenue= Specified currency (decimal format)

Amount sold= Specified currency (decimal format)

Farmer recall estimates can be triangulated with purchase or sales amounts and should be less than production amounts unless the product was stored for later sale.

Indicator 4: Focus Crop/Product Revenue

Description	Gross revenue from all sales of focus crop or product
Metric	USD/farm earned for all focus crop/product sales (Can be reported by land area or other product specific units for comparability)
Unit	Best practice is to collect response in locally relevant currency and units, and then perform conversion to a standard international unit (USD; USD/land area)
General Guidance	<p>The simple approach (which avoids the additional time and resources necessary for detailed accounting while still providing good results) is to ask for the total revenue from sales of focus crop as a whole during the last production year. This indicator can also be reported on a per hectare basis to allow comparability across projects and regions. More complex approaches will ask for the value of each sale and sum those for the production year.</p> <p>This indicator is a Sub-metric for Net Income from Focus Crop/Product Production (or Profit).</p>
Benchmarking	<p>COSA, SFL, ISEAL Guidance on Reporting Farm Economic Metrics: https://thecosa.org/iseal-sustainable-food-lab-cosa/ SDG 2- Zero Hunger</p> <p>ISEAL Common Core: Business Resilience- Net revenue over last year from product produced according to standard GCP Common indicators</p>
Performance Standard	Can be benchmarked to crop and/or regional or national averages.
Limitations	When looking at changes in revenues from year to year, it is important to consider the impacts from changes in prices, bonuses, premiums or deductions, quality, or in yields or land area devoted to the focus crop for additional context.
Calculation	<p>[Total Revenue] * (conversion factor to USD)/ farm or ha under focus production) OR</p> <p>Price(s) per unit of focus crop (See "Price" Indicator) * the number of units sold during the last production year.</p>
Data Source	Document which of the following data sources were used: Estimated/ farmer recall

Sample Survey Questions	<p>Farm records</p> <p>Sales records or purchase records from buyer</p> <hr/> <p>How much money did you receive (in total for the production year) from sales of focus crop or product? _____</p> <p>More advanced methodologies will ask for the total amount of USD received per each sale and sum those for the production year.</p>
Validations	<p>Revenue= Specified currency (decimal format)</p> <p>Land area= Number (decimal format)</p> <p>Farmer recall estimates can be triangulated with purchase or sales quantities and/or price data.</p>

Indicator 5: Focus Crop/Product Costs of Production

Description	Total costs incurred during the last production year to produce the focus crop/ product
Metric	<p>USD/farm. Sum of costs, direct and indirect, across all relevant categories (see 'General Guidance') for the crop during the last production year.</p> <p>(Can be reported by land area or other product specific units for comparability.)</p>
Unit	Best practice is to collect response in locally relevant currency and units, and then perform conversion to a standard international unit (USD; USD/land area)
General Guidance	<p>Cost of Production is an essential component to understanding producer profitability. Not only does the indicator feed directly into Focus Crop/Product Net Income (Focus Product Revenue-Costs), but it is used in calculations for cost efficiencies of inputs. This is important because many sustainability interventions designed to increase incomes target more efficient input use. Additionally, tracking costs of production can help identify the largest sources of costs within a system, which can be used to develop interventions. Tracking costs of production also helps give a sense of the affordability of production in order to understand the long-term economic viability of the system.</p> <p>The simple approach asks only about the main costs in the production system that typically account for the vast majority of total costs (and the total amount spent on each during the last production year). By focusing on the main costs in a system, this provides a good sense of the economic picture on the farm without adding substantial detail to the approach.</p> <p>Main costs for crops typically include (at a minimum):</p> <ul style="list-style-type: none"> – Fertilizers – Pesticides – Hired Labor – Planting material/ Renovation costs – Energy – Irrigation & water <p>Main livestock costs will include: feed, housing, restocking, veterinary care, transportation, processing, etc.</p>

The full cost accounting approach includes additional items, for example:

- deductions by buyers
- rent of land
- capital assets (depending on the types of assets considered, assets may need to be classed to properly account for the asset value and its depreciation)
- cultivation practices
- traceability and record keeping
- costs of standards or certifications
- planting and reforestation costs
- training costs
- interest on credit
- transportation
- crop/product insurance
- cooperative fees
- the value of unpaid family labor
- any other important costs in the system.

Costs should be associated with the focus crop production only (i.e., if labor is hired for multiple crops or in intercropped systems, only the portion used for the focus product production should be included). One way to make sure that costs are correctly associated with the production of the focus crop/product is to ask for an estimate of the percent of inputs that were used for the focus crop/product.

When calculating costs, include only expenditures coming from the household's own revenue. If inputs are provided as technical assistance for free or at a subsidized cost on a persistent, substantial, and systematic basis it is recommended to report both the cost factoring in the value of the input (at an appropriate determined rate) and also as a true cost (without factoring in the subsidized value).

This indicator is a Sub-metric for Net Income from Focus Crop Production (or Profit).

Benchmarking

COSA, SFL, ISEAL Guidance on Reporting Farm Economic Metrics:
<https://thecosa.org/iseal-sustainable-food-lab-cosa/>

SDG 2- Zero Hunger

ISEAL Common Core: Business Resilience - Total production costs for production according to standard over last year (labor, fertilizer, chemicals, equipment, energy, water)

<p>Performance Standard</p> <p>Limitations</p>	<p>ICO Transparency at Origin</p> <p>COSA Indicators</p> <p>GCP common indicators</p> <hr/> <p>Can be benchmarked to cropping system and/or regional or national averages</p> <hr/> <p>It is important to consider the results in light of the context: for example, in low price years, farmers of tree crops tend not to invest (e.g., by replanting) and instead “mine” the existing plants. If this continues for several years the average plant age gets old or very old (“over-aged”). On the other hand, if prices are generally good, farmers tend to invest heavily and therefore may have high costs reducing the income of a particular year. Inflation rates may also affect the context for production costs.</p> <p>The value of unpaid labor has been included as an <i>optional</i> cost for consideration. The opportunity cost of household labor can be significant especially in smallholder systems where that labor can account for a large percentage of overall farm labor. Where this is significant and it is possible to collect this data (by calculating the time worked and the market price for that time) the data can be used to factor into production costs and noted as such.</p>
<p>Calculation</p>	<p>Calculation: USD total cost of inputs + equipment use + labor for production of the focus product</p> <p>(Can be divided by unit of production or land area)</p>
<p>Data Source</p>	<p>Document which of the following data sources were used:</p> <p>Estimated/ farmer recall</p> <p>Farm records</p>
<p>Sample Survey Questions</p>	<p>For cropping systems: the most important costs in a system should be included--typical costs included below:</p> <ol style="list-style-type: none"> 1. How much did you spend (in total for the last production year) on fertilizers for the target crop? 2. How much did you spend for all pesticides used for the target crop on this farm in the last production year? 3. How many seedlings did you plant during the last production year? For those seedlings, what was the average price per seedling? 4. How many permanent and casual laborers of each type did you hire in the last production year? (Permanent means a

	<p>laborer works at least four days a week for more than 6 months a year.)</p> <p>Labor can be asked by breaking down the number of workers, number of days and typical daily pay per type of labor for both permanent and temporary workers. Permanent labor types include: managerial/supervisory, technical services, general labor, and indirect support activities. Temporary labor includes: focus crop production, harvesting, processing.</p> <p>For livestock systems: questions should consider the cost of feed, housing, restocking, veterinary care, transportation, processing, labor etc.</p>
Validations	<p>Costs=Specified currency (decimal format)</p> <p>Main costs in a system should be specified before an assessment with producers to ensure that the right costs are considered</p>

Indicator 6: Net Income from the Focus Crop/Product

Description	Total revenue from focus crop/product sales less total costs for focus crop/product sold
Metric	USD per farm Can be reported by land area or other product-specific units
Unit	Focus crop/product Revenue and Costs should already be reported in USD (resulting from the Revenue and Cost indicators).
General Guidance	This is a calculation of the “Focus Crop Revenue” indicator less the “Focus Crop Costs of Production” indicator. No additional data points are required.
Benchmarking	COSA, SFL, ISEAL Guidance on Reporting Farm Economic Metrics: https://thecosa.org/iseal-sustainable-food-lab-cosa/ SDG 2- Zero Hunger ISEAL Common Core: Business Resilience- Net revenue over last year from product produced according to standard
Performance Standard	Positive number indicates that focus crop/product production is profitable
Limitations	Changes in focus crop net income year to year will need to be considered in context e.g., changes in prices received, quality, input costs, shocks to the system, or changes in land area devoted to focus production. Many of these factors may not be within the farmers direct control.
Calculation	Total Revenue-Total Costs for Focus Crop Production (USD)/ farm
Data Source	<i>Calculation.</i>
Sample Survey Questions	<i>Calculation.</i>
Validations	Ensure that the revenue and cost data refer to both the same production year and the same production units. That is, costs associated with other products sold or products produced during different time periods should not be associated with the current year focus crop/product revenue figures.

Indicator 7: Net Income from other On-Farm Activities

Description	<p>Net Income from all other farm activities (revenue - costs)</p> <p>Refers to other commodities, livestock & by-products, or on-farm services provided</p>
Metric	USD/Farm
Unit	Best practice is to collect response in locally relevant currency, and then perform conversion to standard currency (USD)
General Guidance	<p>This includes both the revenue and costs for all other productive farm activities, which could include other crops and products and/or farm services. Beyond the focus crop/product, it is important to understand other crop and animal products produced on the farm, the amount sold, revenue generated, and costs incurred for producing those crops or products. This helps us calculate the Net Income from the other crops/ products and also factors into the Net Household Income calculation.</p> <p>Diversified agricultural systems (those that rely on more than a single crop for income) are more economically and environmentally resilient. Producers that produce multiple crops or products for sale are more insulated from shocks like crop failures, they produce an increased variety of foods that can be consumed (improving food security and dietary diversity) and contribute to biodiversity and the environmental health of the farm.</p> <p>Tracking revenues from other crops also gives a picture of how focus crop/product and non-focus revenue contribute to the overall economic situation on the farm and reveals the degree of dependence on focus crop/product production to generate income.</p>
Benchmarking	COSA, SFL, ISEAL Guidance on Reporting Farm Economic Metrics

Performance Standard	<p>Farms with some levels of diversification are considered more resilient in the sense that all of the income from the farm is not dependent solely on the focus crop or product.</p> <p>Positive number indicates that other on farm activities are profitable</p>
Limitations	<p>This indicator should always be understood in light of the broader general economic context that includes changes in prices, yields, or land area devoted to the focus crop or other crops.</p> <p>Note that this indicator does consider generally the value of crops or products that are not explicitly monetary (for example, farmers may consume or trade some of their crops, or feed crops to animals). Assessments of smallholder systems or those with greater poverty risk should consider expanding the assessment to get a more holistic understanding of the producer's economic situation, if applicable.</p>
Calculation	Sum of each additional crop or product Revenue- Costs to produce that crop or production
Data Source	<p>Document which of the following data sources were used:</p> <p>Estimated/ farmer recall</p> <p>Farm records</p> <p>Self-reported percentage of total net farm income (can be asked as % net farm income from target crop and then calculate)</p>
Sample Survey Questions	<p>Did you produce any other crops/livestock or other products besides the target crop/product during the last production year? If yes, write the five most important crops/ products in the table, and write the % of production that was sold or traded (not for family consumption). If for sale or trade, write the total revenue received for the crop over the year (either in actual money or the value of the items received in trade) and an estimate for the total cost of production. <i>See tables below.</i></p>

Other Crop(s)/ Product(s)	% For sale or trade (not family consumption)	Revenue from sales or trade (actual money received or value of items received in trade)	Cost of production (estimate)—e.g., fertilizers, pesticides, pay to workers, etc.
1			
2			
3			
4			
5			

Animal/ animal product	% For sale or trade (not family consumption)	Revenue from sales or trade (actual money received or value of items received in trade)	Cost of product (estimate)
1			
2			
3			
4			
5			

Did you receive any income during the last production year from renting farm land or other agricultural items? If so, how much?_____

To triangulate the portion of overall household income coming from the focus crop and other sources, an additional question can be added:

What portion of your total household income (including sales of other crops, livestock, rental income, on-farm businesses, off-farm employment, gifts & remittances, etc.) comes from sales of the target crop or product?

All or almost all (90%+)

Most (75%)

About half (50%)

Some (25%)

Little (10% or less)

Don't know

Validations

Monetary Units: Specified currency (decimal format)

Other on farm revenue amounts should be consistent with the percentage of the overall farm revenue dedicated to the additional crops or products. That is, if the focus crop or product makes up a certain percentage of overall farm income, the inverse of that should be reflected in the amount reported in this indicator.

Indicator 8: Net Income from Off-Farm

Description	<p>Net Income from all other household income-generating activities (revenue - costs)</p> <p>Refers to other earnings (off farm employment, business revenue, and gifts & remittances)</p>
Metric	USD/Household (all members)
Unit	Best practice is to collect response in locally relevant currency and then perform conversion to standard currency (USD)
General Guidance	<p>Diversified revenue streams (those that rely on more than a single source of income) are more economically resilient in the face of shocks. Producers that have other sources of income besides agricultural production--remittances, government transfers, off-farm wages, or income from businesses--are more likely to create a steady income stream for their families in the face of different economic or environmental factors that may impact their agricultural systems.</p> <p>Tracking revenues from other sources also gives a picture of how different streams of income contribute to the overall economic situation on the farm and reveals the degree of dependence on each source of revenue. Remittances can be a large portion of the overall income generating picture on a farm and where possible should be both included in the overall metric but also reported separately as a sub-metric to understand the value and contribution of remittances to the overall economic picture for the household.</p> <p>Information should be obtained on all household member income-generating activities.</p>
Benchmarking	<p>ICO Transparency at Origin indicators</p> <p>COSA, SFL, ISEAL Guidance on Reporting Farm Economic Metrics</p> <p>Global Living Wage Coalition</p>
Performance Standard	<p>Households with some levels of diversification are considered more resilient in the sense that all of the income is not coming from a single source.</p> <p>Positive number indicates that other on-farm activities are profitable.</p>

Limitations	This indicator does not factor in asset values, capital or credit.																														
Calculation	Sum of all other off-farm business revenue streams- costs incurred to generate that revenue.																														
Data Source	Document which of the following data sources were used: Farmer Estimates/Recall Household records Self-reported percentage of total net household income																														
Sample Survey Questions	<p>Has the household received any money such as remittances from friends/relatives, gift money to pay for health or education, or any other money not earned from a job in the last production year?</p> <p>If yes, how much did you receive during the last production year from these sources?</p> <p>In the last production year, did you or any other member of your household earn income off the farm? If yes, fill out the below table.</p> <table><thead><tr><th></th><th>Off-farm Income Source</th><th>[Units of Time] worked per year</th><th>Amount typically brought home after expenses (answer rate basis next)</th><th>Rate Basis (indicate: yearly, monthly, weekly, daily, one-time)</th></tr></thead><tbody><tr><td>1</td><td></td><td></td><td></td><td></td></tr><tr><td>2</td><td></td><td></td><td></td><td></td></tr><tr><td>3</td><td></td><td></td><td></td><td></td></tr><tr><td>4</td><td></td><td></td><td></td><td></td></tr><tr><td>5</td><td></td><td></td><td></td><td></td></tr></tbody></table>		Off-farm Income Source	[Units of Time] worked per year	Amount typically brought home after expenses (answer rate basis next)	Rate Basis (indicate: yearly, monthly, weekly, daily, one-time)	1					2					3					4					5				
	Off-farm Income Source	[Units of Time] worked per year	Amount typically brought home after expenses (answer rate basis next)	Rate Basis (indicate: yearly, monthly, weekly, daily, one-time)																											
1																															
2																															
3																															
4																															
5																															
Validations	<p>Monetary Units: Specified currency (decimal format)</p> <p>Ensure that income from all household members is included. For reference, we define household members as: number of people, regardless of relationship, who normally (for at least 6 consecutive or non-consecutive months of the year) live in a particular residence, occupying it wholly or partially, and who together fulfill their nutritional needs and share expenses from a common pot.</p>																														

7. Appendix 1: List of Resources

This work pulls from several collaborations and co-created resources on topics of Income and Cost of Production, including:

1. SFL, COSA, ISEAL Alliance: “Measuring Smallholder Incomes” Towards better alignment and reporting of farm economic metrics” (October 2016):
<http://sustainablefoodlab.org/wp-content/uploads/2015/12/Guidance.Farm-economics-metrics.Nov2016.pdf>
2. GCP Common Indicators and Technical Specifications for Coffee Sustainability Overview: <https://www.globalcoffeeplatform.org/our-work/tools/coffee-data-standard/#integration>
Coffee Data Standard: <http://datastandard.globalcoffeeplatform.org/en/latest/>
3. The Anker Living Income methodology: <https://www.living-income.com/measurement-living-income>
4. The Anker Living Wage methodology: <https://globallivingwage.org/about/anker-methodology/>
5. Living Income Community of Practice- LICOP: <https://www.living-income.com/>
6. LICOP Actual Income, prepared by The COSA and KIT: <https://www.living-income.com/measurement-actual-income>
7. Global Living Wage Coalition: <https://globallivingwage.org/about/>
8. ICO CPPTF Technical workstream II: Transparency at Origin on Cost of Production and Actual Income (currently developed for coffee but that can be applied to any agriculture commodity): <https://ico.thecosa.org/indicators/>
9. Farmer Income Lab: <https://www.mars.com/sustainability-plan/thriving-people/increasing-farmer-income/farmer-income-lab-publications>

8. Appendix 2. Simple Performance Monitoring Sampling Guidelines

Below are instructions for deploying the sampling strategy recommended for a lightweight monitoring-style income and cost of production assessment. It is based on a simple random sample of a mean for a population.

The size and composition of the sample for *monitoring* purposes is primarily determined by practical concerns for representativeness and minimal bias. Thus, the sample size formula for estimating the mean of a variable from an unknown population size depends on the following:

Variance of key variables among the target population σ^2

Margin of error chosen (typically set at 5% and not greater than 10%) ε

Confidence interval (typically 90% to 99%) $Z_{1-\alpha/2}$

$$n = \frac{Z_{1-\alpha/2}^2 \sigma^2}{\varepsilon^2}$$

In simple terms, suppose you choose a sample to allow a certain level of error (5%) with a 95% confidence interval, and you find the estimated sample mean for farmer income equal to \$1000. Results can be read as follows: "In 95% of all possible samples derived from the population of study, the real mean value lies between \$950 and \$1050. With a 10% margin of error, it would indicate that the real mean value lies between \$900 and \$1100. In this sense, the higher the confidence interval (95% or more), and the smaller the error term (5% or less), we will have an estimated mean for the outcome of interest that is closer to its actual value in the population.

The guidelines are as follows:

Determine the size of the target population: Identify how many farmers are targeted by the supply chain, project, or intervention.

Sample size recommendations: As a general recommendation, in order to be statistically valid, we suggest that the sample size fall between the 5%-10% margin of error below. We created the following table as a quick reference guide for selecting a sample size in Monitoring contexts which utilizes the approach described above.

Population	Sample size (for finite population)	
	Margin of error	
	5%	10%
100	87	61
200	152	88
300	202	102
400	243	112
500	277	118
1000	382	134
2000	471	143
5000	549	150
10000	580	152
15000	592	153

*Note: 90% confidence level, COSA can share the assumptions used to create this model

To refine the sample size number within the ranges presented above, consider:

The size of the project (number of farmers targeted)

Relative homogeneity of the farmers

Desired scope and budget for gathering data on farmers

Geographical dispersion of farmers and logistics capabilities to reach them

Number of surveyors

Timing and window of opportunity (seasonality, timeframes)

Determine the sampling ratio: The ratio of your sample size to the size of the total target population tells you how many farmers you will be surveying. For example, if the target population is 3,000 farmers and the sample size is determined to be 500, you would need to survey 1 out of 6 farmers ($500/3,000 = 1/6$). You would then randomly select 1 out of every 6 listed target farmers to survey—this will help ensure a more representative sample and will minimize bias.

A good sampling plan generates a representative sample and minimizes bias so that the results can be applied to the rest of the target group as a whole. Below are different surveying options that can be followed if you are not doing a census. The choices will depend on the information already available and the desired level of rigor in the results. Note also that techniques such as stratification or clustering – particularly at village and organizational levels - can be used. The samples are selected to allow both descriptive analysis and econometric analysis that detect, with high levels of confidence, the differences in the performance between different groups.

Simple Random Sample. Requires you to have a list of all targeted farmers or other beneficiaries in your project and their locations in order to use this approach. (It is worth noting that surveying on individual farms is considerably more accurate than surveying in group settings, but the tradeoff is that it is also more costly and time consuming).

Randomly select the farmers or beneficiaries to survey (according to the sample size) from the list of targeted farmers.

Surveyors go to the random list of farms or households to conduct the survey

Systematic Random Sample. If you do NOT have a list of targeted farmers or you have a list without farm locations, you will need to use this method. You may also choose this method because it is more cost effective.<sup>[1]
SEP]</sup>

Sampling is done in collective settings where project technicians or implementers interact with target farmers or household members (e.g., collection points, training, demonstration plots).

Use the sampling ratio above to determine which producers at the collective location will be surveyed. For example, if your ratio is 1 out of 6 producers, you would survey every 6th producer that comes to training, for example.