



MAFF
Ministry of Agriculture,
Forestry and Fisheries

The report on Pilot Survey result of the SAS-PSA project



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Chapter 1 Introduction

1.1 Background

Sustainable agriculture is at the heart of the 2030 Agenda and the first fundamental step to securing zero hunger. While many of the SDGs address issues related to agriculture, SDG indicator 2.4.1 is fully dedicated to it. Led by FAO and in collaboration with the Global Strategy to improve Agricultural and Rural Statistics (GSARS), work progressed through 2015-18 to establish a methodology to measure progress towards achieving Target 2.4. A two-page methodology note, endorsed by the IAEG-SDG in March 2016, described, in broad terms an approach to the measurement of this indicator of which the most challenging aspect is the definition of productive and sustainable agriculture. Through 2016 research focused on a broad-ranging literature review on “Frameworks and Methods for Measuring and Monitoring Sustainable Agriculture” (Hayati, 2017) conducted by the GSARS. A key aspect of all approaches to measuring sustainable agriculture is the recognition that sustainability is a multi-dimensional concept, which therefore needs to be reflected in the construction of the indicator. A technical meeting was convened in December 2016 involving several experts in sustainable agriculture to establish priority areas for measurement for indicator 2.4.1. The results were drawn together to complete a first draft of the methodological paper. That draft was presented to the February 2017 meeting of the Scientific Advisory Committee (SAC) of the GSARS.

There has been considerable discussion over the past thirty years on how to define “sustainable agriculture”. As agriculture contributes to development – as an economic activity, as a source of livelihood, and a provider and user of environmental services – the 2030 Agenda suggests that all sectors, including agriculture, be considered from three dimensions of sustainability: economic, environmental, and social.

SDG indicator 2.4.1, defined as the “proportion of agricultural area under productive and sustainable agriculture,” is no different. In the past, it had been defined primarily along with environmental criteria. If the soil was bad, or if water was not managed well, then a farm might have been considered unsustainable. In recent years, however, there has been a realization that being sustainable reaches much further, including economic and social dimensions, and putting farmers in the center. If a farm is not economically sound or not resilient to external shocks, or if the well-being of those working on a farm is not considered, then a farm cannot be sustainable.

Indicator 2.4.1 - Proportion of agricultural area under productive and sustainable agriculture, the area under productive and sustainable agriculture captures the three dimensions of sustainable production: economic environmental, and social. The measurement instrument - farm surveys - will give countries the flexibility to identify priorities and challenges within the three dimensions of sustainability. Land under productive and sustainable agriculture will be those farms and associated agricultural land areas that satisfy the sustainability criteria of the sub-indicators selected across all three dimensions. This indicator will measure progress towards SDG Target 2.4. The SDG indicator 2.4.1 was developed through a multi-stakeholder process involving statisticians and technical experts from countries, international organizations, national statistical offices, civil society, and the private sector. It brings together

themes on productivity, profitability, resilience, land and water, decent work, and well-being to capture the multidimensional nature of sustainable agriculture. They are being pilot tested in selected countries from different regions.

To achieve the goals of SDGs in the region, the AFSIS project will develop data for agricultural productivity improvement and promotion of sustainable agriculture and use it as basic data for policy making, strengthening the ASEAN Food Security Information System (AFSIS) activities which contribute to monitoring the food security situation throughout the ASEAN region for providing accurate and comparable agricultural statistics data collected using a unified survey method developed by SAS-PSA project in 2020-2022, conduct survey in three pilot countries namely Thailand, Laos and Cambodia. For Laos. The ASEAN Food Security Information System (AFSIS) decided to tackle the “Project for Supporting Agricultural Survey on Promoting Sustainable Agriculture in ASEAN Region” from 2021, starting from May 2021-March 2022 based on the project document, the project will provide a pilot survey and workshops to the Center for Agricultural Statistics (CAS), Department of Planning and Finance (DoPF), Ministry of Agriculture and Forestry (MAF), Lao People Democratic Republic (Lao PDR).

1.2 Objective

There are 5 main objectives of this project:

- 1) To raise the capacity building of the technical staff to understand the concept and methodology of SDG indicator 2.4.1.
- 2) To develop an appropriate survey method for collecting data related to SDG indicator 2.4.1.
- 3) To conduct the pilot survey in Khammouane Province, Laos.
- 4) To share experiences from Khammouane Province, Laos with sectors concerned and all ASEAN members
- 5) To publish results on the new survey through AFSIS

1.3 Scope of Study

The scope of this study is to raise the capacity building of the technical staff in Laos to understand the concept and methodology of SDG indicator 2.4.1 from three dimensions to be covered Indicator 2.4.1 includes environmental, economic, and social dimensions in the sustainability assessment, the 11 themes within each dimension, and a sub-indicator for each theme by conducted pilot survey in Khammouane Province. The scope of indicator 2.4.1 is the agricultural farm holding, and more precisely the agricultural land area of the farm holding, i.e., land used primarily to grow crops and raise livestock. Forestry, fisheries, and aquaculture activities may be included to the extent that they are secondary activities conducted on the agricultural area of the farm holding, for example, rice-fish farming and similar systems.

1.4 Period of Study

The Project implementation period is 11 months from May 2021 to March 2022.

1.5 Definition of Terms

There are some main definitions (*for the detail in Annex 2 Enumerator Manual*) as below:

- **Indicator:** Overall measure of sustainable agriculture.
- **Dimension:** The dimensions of sustainability: economic, environmental, social.
- **Themes:** Specific areas within a dimension (e.g. land productivity, biodiversity, decent employment, etc.)
- **Sub-indicator:** Variable used to measure the performance of the farm concerning a given theme.
- **Sustainability criteria:** Critical/thresholds values against which the performance of each sub-indicator is assessed to classify the farm in terms of the sustainability level.
- **Holdings in the Household sector** are those where the holder is a civil (natural) person or group of civil (natural) persons.
- **A combination of the legal status of the holder and the holding** is used to refine the limits between the household and non-household sector holdings.
- **Owned and operated:** The holder or members of the holder's household possess the title of ownership, which gives the holder the right to sell/mortgage/lease and determine the nature and extent of the use of the land parcels.
- **Rented-in:** The land is held under conditions that enable it to be operated as if legally owned by the holder or members of the holder's household. This type of legal owner-like possession is where land is operated under the long or short-term lease, with nominal rent.
- **Other (occupied, borrowed for free, etc.):** The holder has operated the land without interruption for a long period without any form of legal ownership, title, long-term lease, or payment of rent, or the land is operated under a system in which a rent-free land is received and retained as long as it is kept under cultivation by the recipient's personal and household labor, but which cannot be sold or mortgaged
- **Owned and rented-out:** Rented land to someone else means land that is rented or leased out by the holding to other persons/holdings, usually for a limited period. Rental arrangements can be short or long-term and may take different forms. Land may be rented for an agreed sum of money and/or produce, for a share of the produce, or in exchange for services. Land may also be granted rent-free.
- **Land under temporary crops** includes all land used for crops with a less than the one-year growing cycle; that is, they must be newly sown or planted for further production after the harvest. Some crops that remain in the field for more than one year may also be considered temporary crops. For example, strawberries, pineapples, and bananas are considered to be annual crops in some areas. Such crops could be classified as temporary or permanent according to the custom in the country.
- **Land under temporary meadows and pastures** includes land temporarily cultivated with herbaceous forage crops for mowing or pasture. A period of fewer than five years is used to differentiate between temporary and permanent meadows and pastures. If country practice differs from this, the country definition should be indicated in census reports.
- **Land temporarily fallow** refers to arable land at prolonged rest before re-cultivation. This may be part of the holding's crop rotation system or because the normal crop

cannot be planted because of flood damage, lack of water, unavailability of inputs, or other reasons.

- **Land under permanent crops** refers to land cultivated with long-term crops which do not have to be replanted for several years; land under trees and shrubs producing flowers, such as roses and jasmine; and nurseries (except those for forest trees, which should be classified under “forest and another wooded land”). Land under permanent meadows and pastures is excluded from land under permanent crops.
- **Land under permanent meadows and pastures** includes land used permanently (for five years or more) to grow herbaceous forage crops, through cultivation or naturally (as wild prairie or grazing land). Whether land under permanent meadows and pastures is cultivated or naturally grown has important environmental implications.
- **Land under farm buildings and farmyards** refers to surfaces occupied by operating farm buildings (hangars, barns, cellars, and silos), buildings for animal production (stables, cow sheds, sheep pens, and poultry yards), and farmyards. The area under the holder’s house(including the yard around it) is also classified here if it makes up part of the agricultural holding
- **Forest land** is land spanning more than 0.5 ha with trees higher than 5 meters (m) and a canopy cover of more than 10 percent, or trees that can reach these thresholds in situ. It covers both natural and plantation forests. It includes forest roads, firebreaks, and other small open areas, as well as areas that are temporarily not under trees (due to clear-cutting as part of forest management practice, abandoned shifting cultivation, or natural disasters) but are expected to revert to the forest within five years (in exceptional cases, local conditions may justify the use of a longer time frame). Windbreaks, shelterbelts, and corridors of trees with an area of more than 0.5 ha and a width of more than 20 m are included. Forest tree nurseries that form an integral part of the forest should be included. Other wooded land islands spanning more than 0.5 ha with (i) trees higher than 5 m and a canopy cover of 5 to 10 percent, or trees able to reach these thresholds in situ; or (ii) trees not able to reach a height of 5 m in situ but with a canopy cover of more than 10 percent (e.g. some alpine tree vegetation types, arid zone mangroves, etc.); or (iii) combined cover of shrubs, bushes, and trees of more than 10 percent.
- **The area used for aquaculture** includes the area (land, inland waters, or coastal waters) for aquaculture facilities, including supporting facilities. Aquaculture refers to the farming of aquatic organisms such as fish, molluscs, crustaceans, plants, crocodiles, alligators, and amphibians. Farming implies some form of intervention in the rearing process to enhance production, such as regular stocking, feeding, protection from predators, etc.
- **Another area not elsewhere classified** includes all other areas on the holding that are not elsewhere classified. It includes uncultivated land producing some kind of utilizable vegetable product, such as reeds or rushes for matting and bedding for livestock, wild berries, or plants and fruit. It also includes land which could be brought into crop production with a little more effort than that required for common cultivation practices. Also included under this category: land occupied by non-farm buildings; parks and ornamental gardens; roads or lanes (except forest roads, which are included in the forest); open spaces needed for storing equipment and products; wasteland; land under

water not used for aquaculture; and any other area not reported under previous classes (such as marshlands, wetlands, etc.)

- **The production of crop products:** covering also the growing of genetically modified crops-- include growing of non-perennial crops and perennial crops, such as growing cereals, leguminous crops, and oilseeds in open fields, including those considered organic farming and the growing of genetically modified crops, etc. Further typologies of crop production include growing of rice vegetables and melons, roots and tubers; growing of sugar cane, growing of tobacco; and finally growing of fiber crops
- **The production of animal products** -covering also the raising of genetically modified animals—including raising of cattle and buffaloes; raising of horses and other equines; raising of camels and camelids; raising of sheep and goats; raising of swine/pigs; raising of poultry, and finally raising of other animals. Products derived from raising one or more of the above animals are also included in the livestock production
- **Profitable agricultural holdings** are those having a positive profit. Profitability here is measured using Net Farm Income that the holding can earn from farming operations. The focus of the Net Farm Income sub-indicator is on income from farming operations as opposed to the total income of the holding household which may include income from other sources e.g. employment in local businesses by other family members, tourism activity, etc. While these other sources of income are important in the context of assessing the sustainability of living in rural areas, they are not of direct relevance in the assessment of the sustainability of agriculture.
- **Gross Farm Income** refers to the monetary and non-monetary income received by the farm. Its main components include cash receipts from the sale of farm products, direct program payments to producers, other farm income (such as income from custom work), the value of food and fuel produced and consumed on the same farm, and change in the value of year-end inventories of crops and livestock.
- **Net farm Income** refers to the return (both monetary and non-monetary) to farm operators for their labor; management and capital, after all, production expenses have been paid (that is, Gross Farm Income minus production expenses). It includes net income from farm production, the value of commodities consumed on the farm, depreciation, and inventory changes.
- **Drought:** A prolonged period of abnormally low rainfall, leading to a shortage of water.
- **Flood:** An overflow of a large amount of water beyond its normal limits, especially over what is normally dry land.
- **Pest:** A destructive insect or another animal that attacks crops, food, livestock, etc. This can include also heat waves
- **Market shock:** Any demand or supply-side shocks that alter the price matching equilibrium in the market e.g. price reduction for the commodities produced by the holding.
- **Credit:** Credit may have been obtained from formal/informal sources, such as banks, relatives, or local money lenders. There has to be an explicit agreement between the lender and the borrower (holding) detailing the terms and conditions of the loan i.e. time of repayment and interest charge on top of the principal amount etc.
- **Insurance:** Preventive protection measures to protect the holding against external shocks.

- **Antimicrobials:** The term “antibiotic growth promoter” is used to describe any medicine that destroys or inhibits bacteria and is administered at a low, sub-therapeutic dose. The use of antibiotics for growth promotion has arisen with the intensification of livestock farming. Antimicrobials are products that kill microorganisms or keep them from multiplying (reproducing) or growing (<https://animalantibiotics.org/dig-deeper/industryglossary/>). According to the National Office of Animal Health (NOAH, 2001), antibiotic growth promoters are used to “help growing animals digest their food more efficiently, get the maximum benefit from it and allow them to develop into strong and healthy individuals”. Although the mechanism underpinning their action is unclear, it is believed that the antibiotics suppress sensitive populations of bacteria in the intestines (<http://www.fao.org/tempref/docrep/fao/007/y5159e/y5159e05.pdf>).
- **Crop rotation:** The practice of growing different crops in succession over a given period on the same land, predominantly to preserve the productive capacity of the soil. Crop rotation implies simply dividing the growing space into some distinct areas, identifying the crops to grow, and then keeping plants of the same type together in one area. Every year the plants grown in each given area are changed so that each group (with its requirements, habits, pests, and diseases) can have the advantage of new ground.

1.6 Methodology

This survey was conducted based on the guideline from FAO’s SDG 2.4.1 methodological note. This methodological note has been developed with the technical and financial support of the Global Strategy to Improve Agricultural and Rural Statistics. *For the detail attached in Annex 3 SDG 2.4.1 Methodological note*

1.7 Outcomes

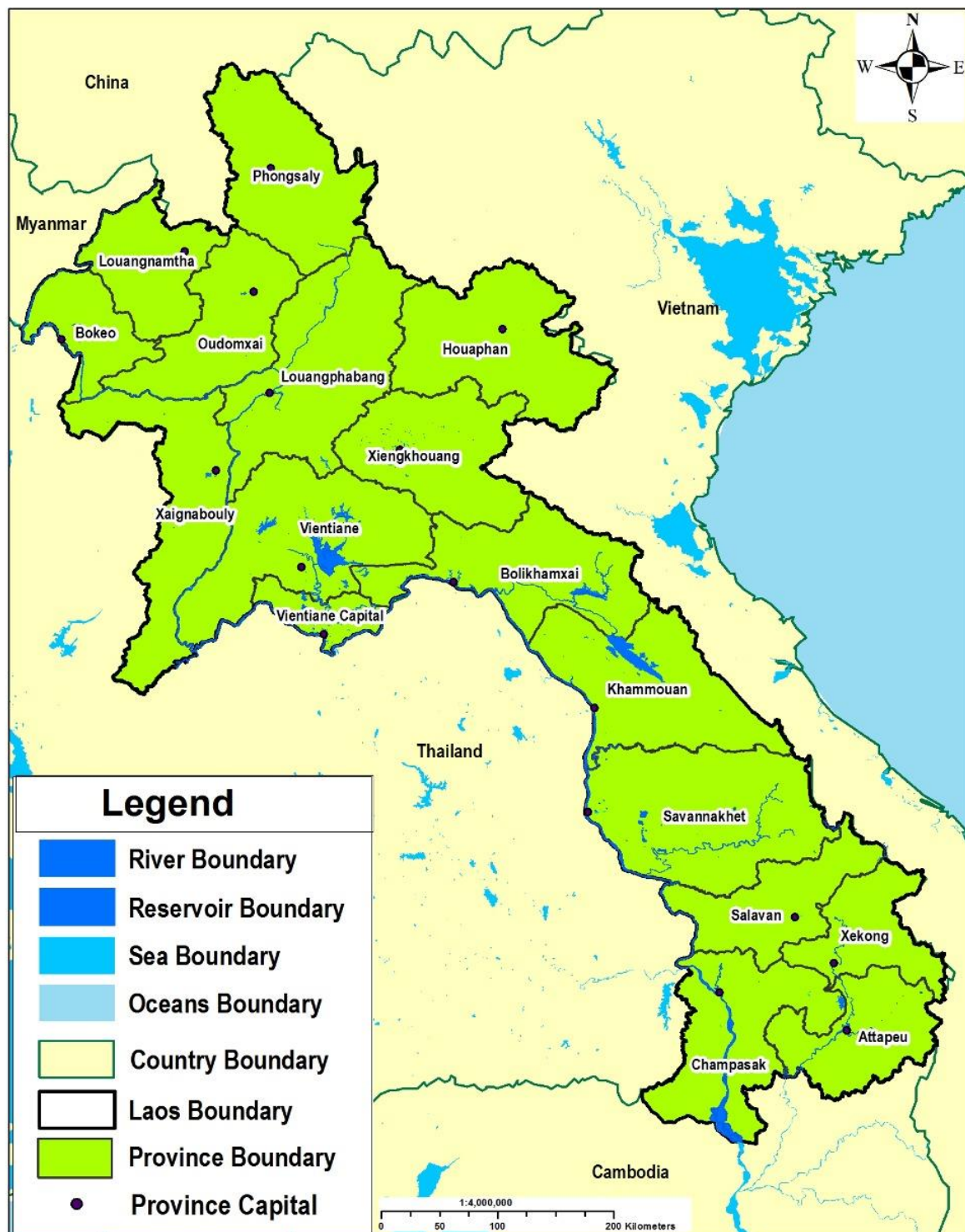
This project is very helpful and useful for our country especially, CAS that can raise the capacity building of their technical staff to understand the concept and methodology and can use an appropriate survey method for collecting data related to SDG indicator 2.4.1 to extend the survey to other provinces in the whole country in the future to have the accurate data for supporting the SDG indicator 2.4.1 policymaker, and other users. This indicator measures the progress in achieving more productive and sustainable agriculture. It is made up of relevant sub-indicators that will provide governments with strategic information for evidence-based policies.

Chapter 2 Rationale of the project

2.1 Background of Lao PDR

Lao People's Democratic Republic or called "Laos" is a landlocked country located in middle Southeast Asia. Laos is bordered by Myanmar and China to the northwest, Vietnam to the east, Cambodia to the southeast, and Thailand to the west and southwest. Its capital and largest city is Vientiane. And primarily focused on agricultural production.

Figure 1 Laos map



Source: Author created by using ArcGIS software

The Agriculture and Forestry Sector is one of the sectors that play an important role in implementing the Party's guidelines and policy and the social-economic development plan of the Government concerning agricultural and forestry activities. Since the country has won its independence and established the Lao People Democratic Republic (Lao PDR) Agriculture sector is an important sector of the economic sectors of Laos, as 16.5% of the GDP in 2020 was generated from that sector (ASY.2020.CAS, MAF) and about 72% of the total workforce is engaged in that sector, rice is the predominant crop produced in Lao PDR, where about 77% of all households are involved in rice farming and 69% of households live in the rural area (LAC.2011). Rice plays an important part in the Lao diet and Laos' food security. Lao PDR's consumption per capita rice is the highest amount in the world at about 160kg/year (LECS.2013). Population is 7.2 million people in 2020 (ASY.2020.CAS, MAF), the total area is 237,955 km².

Laos is divided into 18 provinces and one Capital, which includes the capital city Vientiane A new province, Xaisomboun Province, was established on 13 December 2013, the total district is 148 districts. The climate is mostly tropical savanna and influenced by the monsoon pattern. There is a distinct rainy season from May to October, followed by a dry season from November to April. Local tradition holds that there are three seasons (rainy, cool, and hot) as the latter two months of the climatologically defined dry season are noticeably hotter than the earlier four months.

Laos is mostly between latitudes 14° and 23°N (a small area is south of 14°), and longitudes 100° and 108°E. Its thickly forested landscape consists mostly of rugged mountains, the highest of which is Phou Bia at 2,818 meters (9,245 ft.), with some plains and plateaus. The Mekong River forms a large part of the western boundary with Thailand, where the mountains of the Annamite Range form most of the eastern border with Vietnam and the Luang Prabang Range the northwestern border with the Thai highlands. There are two plateaux, the Xiangkhoang in the north and the Bolaven Plateau at the southern end. Laos can be considered to consist of three geographical areas: north, central, and south Laos had a 2019 Forest Landscape Integrity Index mean score of 5.59/10, ranking it 98th globally out of 172 countries

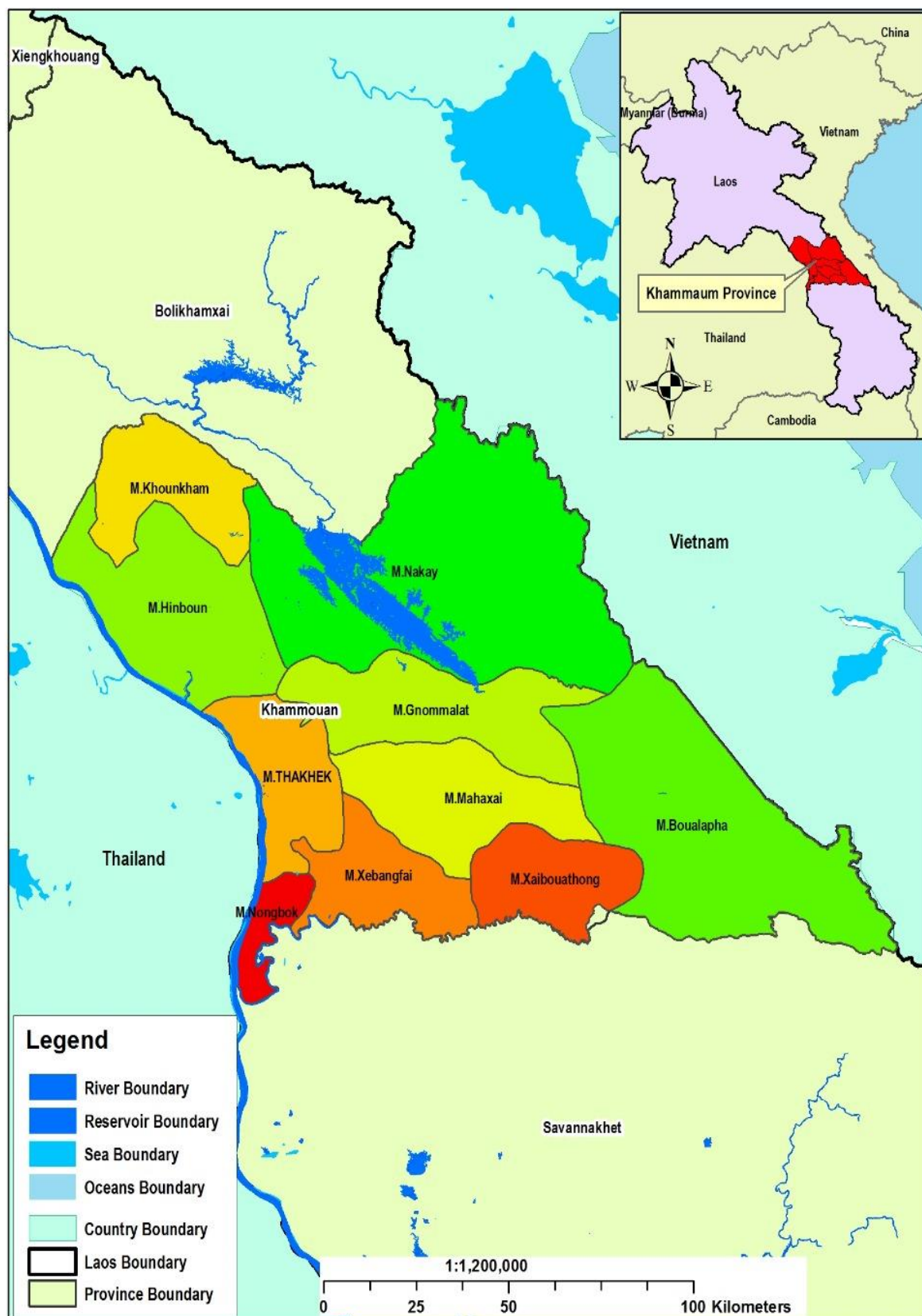
Laos is a member of the Asia-Pacific Trade Agreement, the ASEAN, East Asia Summit, and La Francophonie. Laos applied for membership of the World Trade Organization in 1997; on 2 February 2013, it was granted full membership. Center for Agricultural Statistics (CAS) Department of Planning and Finance, Ministry of Agriculture and Forestry is the one organization that has collaborated with ASEAN Food Security Information System (AFSIS) Project for a long time.

2.2 General information of Khammouane Province

Khammouane Province is a province in the center of Laos. It is a very suitable province for this pilot survey of the "Project for Supporting Agricultural Survey on Promoting Sustainable Agriculture because Khammouane Province consists of various agricultural productions such as crops, livestock, fishery, aquaculture, non-timber forestry products, and forest. Especially, it covers all lowland, hill, and upland area. It is a priority province of agriculture and forestry development plan of the Ministry of Agriculture and Forestry of Laos for commodity production, and food security. Khammouane Province covers an area of 16,315 square kilometers and is mostly of forested mountainous terrain. Many streams flow through the province to join the Mekong River. The vast forests of the Nakai-Nam Theun National Park

are an important watershed that feeds many Mekong tributaries as well as form the catchment area for Nam Theun 2, the largest hydropower project in Laos. The population of the province according to the 2015 Population census is 392,052. There are 10 Districts:

Figure 2 Khammouane Province Map



Source: Author created by using ArcGIS software

The province is bordered by Bolikhamsai Province to the north and northwest, Vietnam to the east, Savannakhet Province to the south, and Thailand to the west. Many streams flow through the province to join the Mekong River. The major rivers originating in the mountains of the province are the Xebangfay River (239 kilometers long), Nam Hinboun, Nam Theun, and Nam Ngum River. Between the Mekong and the Annamite Range, the Khammouane Plateau features gorges, grottoes, jungles, limestone hills, and rivers. The Xe Bang Fai River, Nam Hinboun River, and Nam Theun are the main rivers of the province. Part of the aborted Thakhek-Tan Ap railway would have crossed the province to connect with the North-South Railway at Tân Ấp Railway Station, Quảng Bình Province, Vietnam through Mụ Giạ Pass

Figure 3 picture of thakjek view



Thakhek is the city of Khammouane Province, it is on the Mekong River bordering Thailand. The border checkpoint is Nakhon Phanom. The city has many buildings designed in the French colonial architectural style. The Third Thai–Lao Friendship Bridge, opened to traffic on 11 November 2011, spans the Mekong River. The bridge is 1,423 meters long and 13 meters wide.

Figure 4 picture of Khonglor cave



Tham Khonglor Cave is part of the National Protected Forest Area in Hinboun Mountain. Its west entrance is from Ban Khonglor village in Hinboun District, while the east entrance is from Ban Natan village, Nakai District. The cave runs for a length of about 7.4 kilometers. Its width varies from 10 meters to 90 meters. Its height is in the range of 20 meters to 100 meters. The Hinboun River flows through the cave perennially. Vang that and Had Xay Luang is the two hanging rock formations in the cave. Had Xay Luang is a white sand beach here, of about 150 meters in length and 100 meters in width. The cave is approachable along two routes, one from Vientiane along Route 13 to Hinboun District, and the second route is by boat along the Hinboun River.

Chapter 3 Methodology

3.1 Survey Method (Data collection, Number of sampling, Questionnaire, Enumerator Manual)

3.1.1 Data Collection Methods

The research was utilized by primary data. The data was collected using the interview method through well-structured questionnaires, then using Android Mobile to interview farmers by CSPro application was conducted face to face surveys in 10 Districts of Khammouane Province. CSPro stands for Census and Survey Processing System, it is a software package for entering, editing, tabulating, and disseminating data from surveys and censuses. Using CSPro Entry, the data collection component, you can run a data entry operation on the Windows, Android, and Universal Windows environments. CSPro combines the features of the Integrated System for Survey Analysis and the Integrated Microcomputer Processing System. CSPro can run under Windows Vista, 7, 8, and 10. CSPro is a public domain product, therefore it can be used for free and distributed at no cost. CSPro can be used for data processing from surveys and censuses, both large and small. It is a kind of Computer-assisted Personal Interviewing (CAPI). CAPI is one kind of interviewing technique in which the interviewer or respondent uses an electronic device to answer the questions. The data collected through the questionnaire includes 5 sections and 59 main questions the following: Section I Introduction to the survey module and Identification of the holding and holder consist of 10 questions, Section II: Area of the holding consist of 4 questions, Section A: Economic Dimension consists of 9 questions, Section B: Environmental Dimension consist of 22 questions and Section C: Social Dimension consists of 9 questions. (For detail attached questionnaires and Enumerator Manual in Annex 1 and 2)

3.1.2 Sampling Design

For this study, the One-stage systematic random sampling technique was utilized divided the 220 sample samples of households by the percentage of each two categories such as **Category 1**, is Farm household's activities classified into two groups: "Crop only" and "Crop and Livestock". **Category 2**, is the agricultural land area of farm households classified in eight groups: "less than 0.50 Hectares", "0.50-0.99 Hectares", "1.00-1.49 Hectares", "1.50-1.99 Hectares", "2.00-2.99 Hectares", "3.00-3.99 Hectares", "4.00-4.99 Hectares", and "More than 4.99 Hectares", there are 14,419 farm households in 166 Villages, 10 Districts of Khammouane Province from the listing of Lao Agricultural Census 2019 then selected sample households by 3 steps of sample selections:

Sample Selection 1: Divided 220 samples by the percentage of each farm household's activities

No.	Farm household's activities	No. of households	Sample households
1	Crop only	4,185	64
2	Crop and Livestock	10,234	156
Total		14,419	220

Pros:

- Ability to capture survey results by agricultural activity
- Selection can be done easily

Cons:

- The sample may be biased towards small or large scale
- Statistical accuracy of the survey results is not high

Sample Selection 2: Divided 220 samples by the percentage of farm household's agricultural area size.

No.	Farm household's area size(Hectare)	No. of households	Sample households
1	< 0.50	1,133	17
2	0.50-0.99	2,696	41
3	1.00-1.49	4,271	65
4	1.50-1.99	1,513	23
5	2.00-2.99	2,701	41
6	3.00-3.99	1,532	23
7	4.00-4.99	321	6
8	> 4.99	252	4
Total		14,419	220

Pros:

- Ability to capture survey results by scale
- Statistical accuracy of the survey results is relatively high
- FAO also recommends surveying by the size of the area of holding

Cons:

- The sample may be biased towards small or large scale farmers (e.g., Crop and livestock farmers on a small scale, only crop farmers on a large scale, etc.)

Sample Selection 3: The sample for each farm household's agricultural area size, which is the large grouping of Sample Selection 2, is used as a percentage of the composition by farm household's activities of Sample Selection 1

No.	Farm household's area size(Hectare)	Crop only	Crop and Livestock	Total Sample households
1	< 0.50	5	12	17
2	0.50-0.99	12	29	41
3	1.00-1.49	19	46	65
4	1.50-1.99	7	16	23
5	2.00-2.99	12	29	41
6	3.00-3.99	7	16	23
7	4.00-4.99	1	5	6

8	> 4.99	1	3	4
Total		64	156	220

Pros:

- Ability to capture survey results by activity
- Ability to capture survey results by scale
- Statistical accuracy of the survey results is the highest

Cons:

- The sample size is 220 out of 14,419 farmers in the region (i.e., only 1.5% extraction rate), so no matter how hard you try (using the above two methods), the statistical accuracy will not be high.

3.2 Action Plan and Actual Activities

The project implementation period is 11 months from May 2021 to March 2022 for the detail as below:

Items	2021								2022		
	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
1. Select a target province of the pilot survey											
2. Prepare the meeting for relevant stakeholder											
3. Prepare the training workshop for officials of CAS and relevant organizations including enumerators											
4. Participate in the training workshop											
5. Conduct the pilot survey and examine the issues for improvement											
6. Tabulate and analyze results of the survey											
7. Write the summary report on results of the pilot and submit it to AFSIS expert											
8. Prepare the In-country wrap up meeting with CAS											
9. Participate in the In-country wrap up meeting											
10. Write the final report of the activities in Lao PDR											

The Letter of Agreement was signed between The ASEAN Food Security Information System (AFSIS) and the Center for Agricultural Statistics, Department of Planning and Finance, Ministry of Agriculture and Forestry, Lao People Democratic Republic on 25th May 2021, after that we have selected Khammouane Province to be pilot province for this Survey:

Actual activities

Activities	Date
1. Consultative meeting	13 rd May 2021
2. Inception workshop	6 th July 2021
3. Sampling Design	7 th -9 th July 2021
4. Participate in FAO's SDG 2.4.1 training	28 th June – 1 st July 2021
5. Field survey	
- Enumerator training	19 th -23 rd July 2021
- Enumeration in Khammouane Province	1 st -17 th August 2021
6. Tabulating and editing data	
- Data analysis training	6 th -10 th September 2021
7. Analyze data	September – October 2021
8. Write the summary report	November 2021
9. Wrap up meeting	21 st December 2021
10. Final report and Financial report submission	30 th December 2021

3.2.1 Inception Workshop

The Inception Workshop on Project for Supporting Agricultural Survey on Promoting Sustainable Agriculture in Lao PDR was held on 6 July 2021 at Vientiane both face to face and via video conference. The workshop was jointly organized by the Center for Agricultural Statistics, Department of Planning and Finance, Ministry of Agriculture and Forestry, Lao PDR, and ASEAN Food Security Information System (AFSIS) and hosted by Lao PDR under the chairmanship of Ms. Vivanh Souvannamethy, Director of the Center for Agricultural Statistics, Department of Planning and Finance, Ministry of Agriculture and Forestry. The Meeting was attended by the members of the Ministry of Agriculture and Forestry, Laos from the department concerned. Representatives from the AFSIS Secretariat and the CAS staff were also present at the workshop.

Figure 5 Picture of the Inception workshop



3.2.2 Enumerator training and pilot test

The Enumerator training and pilot test on Project for Supporting Agricultural Survey on Promoting Sustainable Agriculture in Lao PDR was held on 19-23 July 2021 at Vientiane both face to face and via video conference. The training was jointly organized by the Center for Agricultural Statistics, Department of Planning and Finance, Ministry of Agriculture and Forestry, Lao PDR, and ASEAN Food Security Information System (AFSIS) and hosted by Lao PDR under the chairmanship of Ms. Vivanh Souvannamethy, Director of the Center for Agricultural Statistics, Department of Planning and Finance, Ministry of Agriculture and Forestry. This training was attended by the members of the Ministry of Agriculture and Forestry, Laos from the department concerned. Representatives from the AFSIS Secretariat and the CAS staff were also present at the workshop:

On- 1st day and 2nd day, CAS had conducted the theory training on Enumerator Manual, a List of themes and sub-indicators, the Structure of the questionnaire, Specifications and functioned in the questionnaires. Mr. NIIMI Tomohiro, a Japanese Expert, and Dr. Waraporn Saelee, AFSIS Manager, worked hard to help CAS staff by answering all questions that the enumerator was not clear to make them understand clearly.

- 3rd day, we were training on CAPI, this survey, we will use CAPI on this survey, however, in case, sometimes tablets have low batteries or are broken the enumerator should prepare a power bank or questionnaires to interview the farmers or in case they have problem concerns with CAPI, the enumerator must inform Mr. Sengphachan Khounthikoummame, National Consultant, immediately so that he can help them solve those issue on time. This survey will get the data from the to sever after completing the survey with quantity data and real-time by using CAPI.

On- 4th day, conducted a pilot test in Thadindang Village by divided among 3 group enumerators to interview farmers by using CAPI and questionnaire, the average time for interviewing farmers is 30-45 minutes/household that was a good result.

Figure 6 Picture of Training and pilot test



- 5th day is the final day of our training, the head of 3 group enumerators, presented all the issues that they were facing in the pilot test from Thadindang Village, and we solve that problem clearly and all enumerators ensure and can conduct the real survey with successfully. For the survey at Khammouane Province, we also divided into three groups regarding geographical location and sample households in each village and District.

3.2.3 Enumeration in Khammouane Province

In this survey, there were 9 enumerators conducted the field survey, an average of 30 - 40 minutes per one questionnaire during the time around seventeen days started from 1st – 17th August 2021, we divided into 3 group of enumerators, 3 people per team:

No.	District Name	No. of Village	No. of Sample household	Enumerator Teams	Date
1	Thakhek	13	25	Team 1	1st – 17th August 2021
2	Mahaxay	12	18	Team 1	
3	Nongbok	15	29	Team 1	
4	Hinboun	12	17	Team 2	
5	Ngommalat	14	34	Team 2	
6	Boualapha	15	25	Team 3	
7	Nakaiy	9	13	Team 2	
8	Xebangfai	10	21	Team 3	
9	Xaybouathong	15	30	Team 3	
10	Khounkham	5	8	Team 2	
Total		120	220	3	17

All the enumerators worked very hard in the field survey at Khammouane Province in the rainy season, the condition of roads are very bad, some enumerators go by motorcycle, walking, and travel by boats to sample villages and Sample household with long-distance and took many

hours. The total sample households from this project are 220 households, they can complete interview 218 sample households that means only 2 households is left because the government divide one sample village belong to another province and this village has one sample household and other 1 sample household was the move to another place which not belong to Khammouane Province. These are the reason why we have not completed 2 sample households in this survey.

Before conducting the enumeration in the field, we had to prepare all materials such as installing the CSpro application to all tablets for all enumerators, tablet cases for protecting water chargers, power banks, extra-tablets and bought SIM-cards, internet packages for every three teams, rain coats, bags, rents three pickup cars for 15 enumerated days and contingency budgets for rent motorbikes, boats..e.t.c

Figure 7 picture of field survey





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3.3 Data Analysis (SDG 2.4.1 Methodological note)

This study was used **SDG 2.4.1 Methodological note of FAO (for detail attached in Annex 3)** with both descriptive methods for data analysis of Supporting Agricultural Survey on Promoting Sustainable Agriculture in Khammouane Province. Data were analyzed by using Microsoft Excel Platform, R and RStudio software for the detail as below:

1) Descriptive Analysis

The basic features of the data are described by descriptive statistics, together with simple graphics and table analysis. Descriptive statistics were used to analyze the Characterization of Farm households. It was taken through quantitative and qualitative variables that were significant in understanding farm households' socio-economic-environmental characteristics, types of farming systems, and so on by frequencies, mean, standard deviations, and percentages of these variables were obtained.

2) Model Analysis

This study used Microsoft Excel Platform to analyze the 11 sub-indicators of SDG 2.4.1 of farm households in Khammouane Province and analyzed data for sub-indicators 10 Food Insecurity Experience Scale (FIES) by “Andersen Likelihood test Model” and preparing the data for analysis to excel platform, Parameter estimation, to find the probability value then Calculation of the sustainability status of the agricultural holding.

However, The Data Analysis training on Project for supporting Agricultural survey on Promoting Sustainable Agriculture in Lao PDR was held on 6-10 September 2021 at Vientiane both face to face and via video conference. The training was jointly organized by the Center for Agricultural Statistics, Department of Planning and Finance, Ministry of Agriculture and Forestry, Lao PDR, and ASEAN Food Security Information System (AFSIS) and hosted by Lao PDR under the chairmanship of Ms. Vivanh Souvannamethy, Director of the Center for Agricultural Statistics, Department of Planning and Finance, Ministry of Agriculture and Forestry. This training was attended by the members of the Ministry of Agriculture and Forestry, Laos from the department concerned. Representatives from the AFSIS Secretariat and the CAS staff were also present at the training:

- 1st day, had conducted the theory training on the formula to calculate SDG indicator 2.4.1 Proportion of agricultural area under productive and sustainable agriculture, list of themes and sub-indicators, how to enter the data into the platform, and sub-indicators 1 Farm output value per hectare. Mr. NIIMI Tomohiro, Japanese Expert, and AFSIS Secretariat observed and helped CAS staff by answering all questions that participants were not clear so that they can have a better understanding.
- 2nd-day training on Sub-indicator 2 Net Farm Income (NFI), 3 Risk mitigation mechanisms, 4 Prevalence of soil degradation, and 5 Variation in water availability and updated the database on Mr. NIIMI Tomohiro, Japanese Expert's comments, enumerators checked the data and called farmers to reconfirm.

Figure 8 Data Analysis Training



- 3rd day training on Sub-indicator 6 Management of fertilizers, 7 Management of pesticides, 8 Prevalence of soil degradation, and 9 Wage rate in agriculture and updated the data base on Mr. NIIMI Tomohiro, Japanese Expert's comments, enumerators checked the data and called farmers to reconfirm.
- 4th day, training on R and Rstudio program installation and analyzed sub-indicators 10 Food Insecurity Experience Scale (FIES) data by preparing the data for analysis to the platform, parameter estimation, to find the probability value, and then the calculation of the sustainability status of the agricultural holding.
- 5th day is the final day of our training on Sub-indicator 11 Secure tenure rights to land then checking result in final reporting: dashboard to Summary and adopting all the issues.

Chapter 4 Result and interpretation

This chapter describes the analysis of data followed by a discussion of the objectives. Each analysis will interpret and answer the 11 sub-indicators of SDG 2.4.1 of farm households in Khammouane Province. Data were analyzed, described, explored, and identified the relationship with main factors that affect farm households' operated and finding causes that affect their production by descriptive analysis (summary statistics) and Social, Economics and Environment results of this research.

4.1 Results of the Survey

The main purpose for descriptive analysis is to understand the profile of the farm households, how they operated, and understand the structure of production and farm households' main agricultural purpose for the detail as below:

Variable	Category	Frequency, N	Percentage
Gender	Male	150	68.81
	Female	68	31.19
	Total	218	100.00
Role on the agricultural holding	Holder	183	83.94
	Co-holder	7	3.21
	Manager	9	4.13
	Household member working on the holding	18	8.26
	Employee	1	0.46
	Household member not working on the holding	0	0.00
	Total	218	100.00
The legal status	Civil/natural person	218	100.00
	Group of civil/natural persons	0	0.00
	Legal person	0	0.00
	Total	218	100.00
Type of holding	Household	218	100.00
	Non-Household	0	0.00
	Total	218	100.00
Agricultural area of the household	< 0.5 hectares	22	10.09
	0.5-1.0 hectares	45	20.64
	1.0-1.5 hectares	30	13.76
	1.5-2.0 hectares	34	15.06
	2.0-3.0 hectares	34	15.06
	3.0-4.0 hectares	18	8.26
	4.0-5.0 hectares	15	6.88
	> 5.0 hectares	20	9.71
	Total	218	100.00
Household's Main agricultural	Mainly crop production	109	50.00
	Mainly livestock production	8	3.67
	The mix of the crop, livestock, and other production	101	46.33
	Total	218	100.00

Gender

In this survey, most of the respondents of farm households were male a total of 150 (68.81 %) and only 63 (31.19 %) were female of the farm household. The percentage shows that the male of farm households was much higher than the female of the farm household.

Role on the agricultural holding

The majority of the respondents of farm households were from the holder 183 people (83.94 %), followed by the household member working on the holding, with 18 people representing 8.26 % of the survey. The minority of the respondents of farm households were from the Manager, Co-holder, and Employee of farm household, representing 4.13 %, 3.21 %, and 0.46 %, respectively.

The legal status and the type of holding

All farm households were Civil/natural person for the legal status and were household cover 100%.

Agricultural area of the household

For rice planted area classified in 8 categories, the majority of rice planted area is 0.5 hectares to 1-hectare cover 20.64 % with 45 households, we can say that most of the farm households cultivated small agricultural area. This is followed by more than 1.5 hectares to 2 hectares, with 34 households representing 15.06 %. The next is more than 2 hectares to 3 hectares, with 34 households representing 15.06 % and 1-hectare to 1.5 hectares, with 30 households representing 13.76 % . . The minority of agricultural area: only 15 households had more than 4 hectares to 5 hectares which represent 6.88 %. The average Agricultural area of the household is 2.43 hectares from 218 farm households, the minimum is 0.1 hectares and the maximum is 20.05 hectares.

Variable	Obs. N	Mean	Std. Dev.	Min	Max
Agricultural area (hectares)	218	2.43	2.36	0.1	20.05
Rice area (hectares)	204	1.82	1.52	0.09	14.00
Rice Yield (Tones/hectare)	204	2.18	1.14	0.04	6.30

For the average rice planted area is 1.82 hectares from 204 farm households, we can say that most of the farm households cultivated small rice planted area, the minimum is 0.09 hectares and the maximum is 14.00 hectares, for the yield is quite low, The average yield of the household is 2.18 tones/hectare from 204 farm households, the minimum is 0.04 tones/hectare and the maximum is 6.30 tones/hectare.

Variable	Obs.N	Mean	Std. Dev.	Min	Max
Paddy Rice (Kip/Kg)	204	3,284	1,186	2,000	5,000
Rubber (Kip/Kg)	7	7,350	1,690	5,000	9,450
Cassava (Kip/Kg)	26	823	423	400	1,700
Maize (Kip/Kg)	8	2,125	1,028	1,400	4,500

The price of the main crop, for the paddy rice, is quite low, the average is 3,284 kip/kg, the minimum is 2,000 kip/kg and the maximum is 5,000 kip/kg. For the rubber tree, there is only 7 household from 218 farm households planted rubber tree, the average price of rubber is 7,350 kip/kg, the minimum is 5,000 kip/kg and the maximum is 9,450 kip/kg. For cassava, there is only 26 household from 218 farm households, planted cassava, average price of cassava is 823 kip/kg, the minimum is 400 kip/kg and the maximum is 1,700 kip/kg. For the Maize, there are only 8 households from 218 farm households planted maize, the average price of maize is 2,125 kip/kg, the minimum is 1,400 kip/kg and the maximum is 4,500 kip/kg.

Variable	Obs.N	Mean	Std. Dev.	Min	Max
Buffalo (Kip/Head)	14	8,392,857	2,058,552	5,000,000	14,000,000
Cattle (Kip/Head)	98	3,765,306	1,384,830	1,600,000	10,000,000
Goat (Kip/Head)	7	714,286	121,499	500,000	800,000
Duck (Kip/Head)	9	55,556	19,437	40,000	100,000
Chicken (Kip/Head)	23	40,000	10,975	20,000	65,000

There is about 5 main livestock that farm household raising such as buffalo, cattle, goat, duck, and chicken. Most of them raise cattle, the average price is 3,765,306 kip/head, the minimum is 1,600,000 kip/head and the maximum is 10,000,000 kip/kg. For the buffalo, the average price is 8,392,857 kip/head, minimum is 5,000,000 kip/head and maximum is 14,000,000 kip/kg

Sub-indicator 1: Farm output value per hectare

Dimension: Economic

Theme: Land Productivity

Coverage: All farm types

Reference period: last calendar year

Description:

- Farm output value: The volume of agricultural output at the farm level generally takes into account the production of multiple outputs, e.g. crop types and crop and livestock combinations, etc. Since not all outputs are measured in the same unit, and different outputs represent different products. It is necessary to establish an appropriate means of aggregation, in this case using a monetary unit (i.e. quantity multiplied by prices).
- Farm agricultural land area: defined as the area of land used for agriculture within the farm

Calculation steps:

Step 1: Categorize farms by type of holding

- 1) Household and non-household sectors,
- 2) Main type of production and
- 3) Whether or not they irrigate the agricultural area

For a survey in Lao PDR, we will skip stepping 2 without categorizing farms by type (step1) as the Lao survey extracts very little from the non-household sector, and irrigation heterogeneity does not arise. However, if the results calculated in this way are abnormal, it is necessary to verify the heterogeneity between the categories and to calculate for each category in which the problem occurs.

Step 2: calculate the farm output value per hectare

$$\text{Farm output value per hectare}(i, f) = \frac{\text{Farm output value (LCU)}_{i,f}}{\text{Agricultural land area (in hectares)}_{i,f}}$$

Where; *Farm output value per hectare*_{*i,f*} is the total value of production of the *i*-th agricultural holding (with *f* going from 1 to 12); *Agricultural land area (in hectares)*_{*i,f*} is the agricultural land area, as expressed in a hectare of the *i*-th agricultural holding (with *f* going from 1 to 12)

Step 3: After calculating the farm output value per hectare, the values are sorted from the lowest value to the highest productivity by categories of farms. The value of farm output value per hectare related to the 90th percentile is derived accordingly for each category, using the following formula: **90th=0.9 x total number of observations**

Step 4: classify the agricultural area of the farm according to the following sustainability
In general, the sustainability status of agricultural holdings is determined depending on whether (or not) the farm output value per hectare is above, below, or in between the thresholds set it belongs to. **For the computed farm output value per hectare must be benchmarked against the following thresholds for sustainability by category:**

- Green (desirable): FOVH value is $\geq 2/3$ of the corresponding 90th percentile
- Yellow (acceptable): FOVH value is $\geq 1/3$ and $< 2/3$ of the corresponding 90th percentile
- Red (unsustainable): FOVH value is $< 1/3$ of the corresponding 90th percentile

Step 5: calculate the proportion of agricultural area for the indicator by sustainability status:

Indicators	Area (ha)	Ratio (%)
Desirable	48.99	8.70
Acceptable	106.58	18.90
Unsustainable	408.48	72.40
Total	564.04	100.00

Sub-indicator 2: Net Farm Income (NFI)

Dimension: Economic

Theme: Profitability

Coverage: All farms types

Reference period: last three calendar year

Description: The focus of this sub-indicator is on income from farming operations as distinct from the total income of the farming household, which may include other sources of income such as employment in local businesses by other family members, tourism activity, etc.

Content of each primary variable:

Can be computed according to two approaches ① Sophisticated and ② simplified options (1) and (2)

Calculation steps:

Step 1: ① Sophisticated option:

Calculate Net Farm Income using the formula:

$$NFI = CR + Y_k - OE - Dep + \Delta In$$

NFI = Total Net Farm Income

CR = Total farm cash receipts including direct program payments

Y_k = Income in kind

OE = Total operating expenses after rebates (including costs of labor)

Dep = Depreciation

ΔIn = Value of inventory change

② Simplified options (1):

Calculate Net Farm Income using formula:

$$NFI = CR + Y_k - OE$$

NFI = Total Net Farm Income

CR = Total farm cash receipts including direct program payments

Y_k = Income in kind

OE = Total operating expenses after rebates (including costs of labor)

- Quantities of 5 major crops and 5 major livestock and their products and by-products produced by the farm holding (both for market and/or self-consumption)
- Farm gate prices of the above quantities produced
- Operating expenses including inputs quantities and their market prices that were used to produce crops and livestock
- Quantities of other on-farm secondary activities carried out and/or commodities produced on the farm holding e.g. aquaculture, agroforestry, and others
- Farm gate prices of other on-farm activities/commodities
- Input quantities and prices that are used to produce other on-farm outputs
- The agricultural land area of the farm holding

② Simplified options (2) :

This option is based on the farmer's declaration of the agricultural holding's profitability over the last three calendar years. It is recommended to use this simplified option only when the other two options are not feasible

Content of the primary variables will be 1. Respondent's declaration on agricultural holding's profitability over the last 3 calendar years and 2. The agricultural land area of the farm holding

Step 2: classify the agricultural area of the farm according to the following sustainability

For a farm to be profitable the net farm income should be above zero.

- Green (desirable): NFI is **above zero for the past 3** consecutive years
- Yellow (acceptable): NFI is **above zero for at least 1** of the past 3 consecutive years
- Red (unsustainable): **below zero for all of the past 3** consecutive years

Step 3: calculate the proportion of agricultural area for the indicator by sustainability status

Indicators	Area (ha)	Ratio (%)
Desirable	142.50	25.30
Acceptable	324.63	57.60
Unsustainable	96.92	17.20
Total	564.05	100.00

Sub-indicator 3: Risk mitigation mechanisms

Dimension: Economic

Theme: Resilience

The properties of a system that allows farms to deal with shocks and stresses, to persist, and to continue to be well-functioning (in the sense of providing stability, predictable rules, security, and other benefits to its members).

Coverage: All farms types

Reference period: last calendar year

Description:

This sub-indicator measures the incidence of the following mitigation mechanisms:

1. Access to or availed credit
2. Access to or availed insurance

Access to credit and/or insurance is defined here as when a given service is available and the holder has enough means to obtain the service (required documents, collateral, positive credit history, etc.).

3. On-farm diversification (share of a single agricultural commodity **not greater than 66%** in the total value of production of the holding).

This variable is calculated according to the below formula:

$$\text{On-farm diversification} = \frac{\text{Value of production}_{i,c}}{\text{Total value of production}_i}$$

Where $\text{Value of production}_{i,c}$ the value of production of the c -th agricultural commodity is related to the i -th agricultural holding and $\text{Total value of production}_i$ is the total value of production of the i -th agricultural holding.

Access to credit and/or insurance is defined as when a given service is available and the holder has enough means to obtain the service. While **On-farm diversification** captures the share of the value of production of one single agricultural commodity over the total value of production of the agricultural. This variable is calculated according to the below formula. If the farmer has access to one or more 3 factors will allow the farm to prevent, resist, adapt and recover from external shocks

Content of primary variables are:

- The holder has access to or avails any of the mechanisms to protect against external shocks
- The total value of production from on-farm activities
- The agricultural land area of the farm holding

Step 1: classify the agricultural area of the farm according to the following sustainability criteria:

A farm holding is considered resilient if it has availed or has the means to access the risk mitigation mechanisms as follows:

- Green (desirable): Access to or availed at least two of the listed mitigation mechanisms.
- Yellow (acceptable): Access to or availed at least one of the listed mitigation mechanisms.
- Red (unsustainable): No access to the listed mitigation mechanisms.

Step 2 : calculate proportion of agricultural area for the indicator by sustainability status

Indicators	Area (ha)	Ratio (%)
Desirable	146.50	26.00
Acceptable	245.78	43.60
Unsustainable	171.77	30.50
Total	564.05	100.00

Sub-indicator 4: Prevalence of soil degradation

Dimension: Environmental

Theme: Soil health

Coverage: All farms types

Reference period: last three calendar years

The farm survey focuses on the four threats that combine the characteristics more widespread and easier to assess through farm surveys:

1. Soil erosion
2. Reduction in soil fertility
3. Salinization of irrigated land
4. Waterlogging
5. Other - specify

The farm survey captures farmers' knowledge about the situation of the agricultural holding in terms of soil degradation. Experience has shown that farmers are very much aware of the state of their soils, health, and degradation level. Farmers may also be offered the opportunity to mention other threats than the above four.

Content of primary variables are:

1. Farmer's experience on soil degradation threats
2. The total area of holding affected by any threats
3. And the agricultural land area of the farm holding

Step 1: of the calculation process, classify the agricultural area of the farm that was affected by any of the listed soil degradation threats by the sustainability status

- Green is The **area affected** by any threats **less than 10%** of the total agriculture area of the farm
- Yellow is The **area affected** by any threats **between 10% and 50%** of the total agricultural area
- While Red is The **area affected** by any threats is **above 50%** of the total area

Step 2: calculate the proportion of agricultural area for the indicator by sustainability status

Indicators	Area (ha)	Ratio (%)
Desirable	333.59	59.10
Acceptable	185.91	33.00
Unsustainable	44.55	7.90
Total	564.05	100.00

Sub-indicator 5: Variation in water availability

Dimension: Environmental

Theme: Water use

Coverage: All farm types

Reference period: last three calendar years

The sub-indicator captures the proportion of agricultural areas by sustainability status associated with farms that use water for irrigation:

1. Use of water to irrigate crops on at least 10 percent of the agricultural area; and
2. Reduction in water availability over time; and (or)
3. Inefficient functioning of organizations that are in charge of water allocation

Content of the primary variables.

1. Use of water for crop irrigation.
2. Total area irrigated.
3. Reduction in water availability
4. Organizations.
5. Agricultural area of the holding.

$$6. \text{Percentage of total area irrigated} = \frac{\text{Total area irrigated}_i}{\text{Agricultural area of the holding}_i}$$

This variable measures the proportion of the total agricultural area of the holding where water was used for irrigating crops;

Step 1: classify the agricultural area of the farm according to the following sustainability criteria:

Farm sustainability concerning water use will be assessed as follows:

- Green (desirable): Water availability **remains stable over the years**, for farms irrigating crops on **more than 10%** of the agricultural area of the farm. Default result for farms **irrigating less than 10%** of their agricultural area
- Yellow (acceptable): uses water to **irrigate crops on at least 10%** of the agriculture area of the farm, **does not know** whether water availability remains stable over the years, or experiences reduction in water availability over the years, but **there is an organization** that effectively allocates water among users.
- Red (unsustainable): in all other cases.

Step 2 : calculate proportion of agricultural area for the indicator by sustainability status

Indicators	Area (ha)	Ratio (%)
Desirable	533.01	94.50
Acceptable	19.40	3.40
Unsustainable	11.64	2.10
Total	564.05	100.00

Sub-indicator 6: Management of fertilizers

Dimension: Environmental

Theme: Fertilizer risk

Coverage: All farm types

Reference period: last calendar year

Description: This sub-indicator is about fertilizer usage, in a particular mineral or synthetic fertilizers and animal manure, their awareness about the environmental risks associated with fertilizer and manure applications, and their behavior in terms of plant nutrient management

Content of the primary variables:

1. Use of fertilizers.
2. Management following measures to help reduce risk:
 1. Follow protocols as per extension service or retail outlet directions or local regulations
 2. Use an organic source of nutrients alone, or in combination with synthetic or mineral fertilizers
 3. Use legumes as a cover crop to reduce fertilizer inputs
 4. Distribute synthetic or mineral fertilizer application over the growing period
 5. Consider soil type and climate in deciding fertilizer application
 6. Use soil sampling at least every 5 years
 7. Perform site-specific nutrient management or precision farming
 8. Use buffer strips along with watercourses.
3. Agricultural land area of the farm holding

Step 1: classify the agricultural area of the farm according to the following sustainability criteria:

- Green (desirable): The farm uses fertilizers but **takes at least 4 specific measures** to mitigate environmental risks. Default result for farms not using fertilizers
- Yellow (acceptable): The farm uses fertilizers and **takes at least two measures** to mitigate environmental risks
- Red (unsustainable): The farm uses fertilizer and **does not take any of the specific measures** to mitigate environmental risks

Step 2: calculate the proportion of agricultural area for the indicator by sustainability status

Indicators	Area (ha)	Ratio (%)
Desirable	237.56	42.10
Acceptable	130.68	23.20
Unsustainable	195.81	34.70
Total	564.05	100.00

Sub-indicator 7: Management of pesticides

Dimension: Environmental

Theme: Pesticides Risk

Coverage: All farm types

Reference period: last calendar year

Description: The proposed sub-indicator is based on information on the use of pesticides on the farms, the type of pesticide used, and the type of measure(s) taken to mitigate the associated risks.

Content of the primary variables:

1. Use of pesticides
2. Type of pesticides
3. Health measures which are:
 1. Adherence to label directions for pesticide use
 2. Maintenance and cleansing of protection equipment after use
 3. Safe disposal of waste
4. Environmental measures as follows:
 1. Adherence to label directions for pesticide application
 2. Adopt any of the above good agricultural practices
 3. Perform biological pest control or use biopesticides
 4. Adopt pasture rotation to suppress livestock pest population
 5. Systematic removal of plant parts attacked by pests
 6. Maintenance and cleansing of spray equipment after use
 7. Use one pesticide no more than two times or in the mixture in a season
5. Agricultural land area of the farm holding

Step 1: classify the agricultural area of the farm according to the following sustainability criteria:

Farm sustainability concerning pesticides will be assessed as follows:

- Green (desirable): The farm uses **only moderately or slightly hazardous** pesticides (WHO Class II or III). In this case, it **adheres to all three health-related measures** and at **least four out of seven of the environment-related measures**. Default result for farms not using pesticides.
- Yellow (acceptable): The farm uses **only moderately or slightly hazardous** pesticides (WHO Class II or III) and takes **at least two** measures each from health and environment-related measures
- Red (unsustainable): The farm uses **highly or extremely hazardous** pesticides (WHO Class Ia or Ib), illegal pesticides, or uses moderately or slightly hazardous pesticides

without taking specific measures to mitigate environmental or health risks associated with their use (fewer than two from each category).

Step 2: calculate the proportion of agricultural area for the indicator by sustainability status

Indicators	Area (ha)	Ratio (%)
Desirable	512.55	90.90
Acceptable	6.00	1.10
Unsustainable	45.50	8.10
Total	564.05	100.00

Sub-indicator 8: Use of AGRO-biodiversity-supportive practices

Dimension: Environmental

Theme: Biodiversity

Coverage: All farm Types

Reference period: last calendar year

Description: This sub-indicator measures the level of adoption of more sustainable agricultural practices that better contribute to biodiversity by the farm at ecosystem, species, and genetic levels.

Two separate scoring systems depending on the applicability of the organic farming criterion will be evaluated/scored differently to obtain the sustainable status;

1. Farms in countries with organic certification in place will have to **check 3 out of 6 criteria**.
2. Farms operating in countries with no organic certification in place will have to **check 2 out of 5 criteria**

A. Criteria for countries with organic certification systems/schemes:

1. Leaves at least 10% of the holding area for natural or diverse vegetation.
2. The farm produces agricultural products that are organically certified, or its products are undergoing the certification process.
3. The farm does not use medically important antimicrobials as growth promoters.
4. At least two of the following contribute to farm production: 1) temporary crops, 2) pasture, 3) permanent crops, 4) trees on the farm, 5) livestock or animal products, and 6) aquaculture.
5. Practices crop or crop/pasture rotation involving at least 2 crops or crops and pastures on at least 80% of the farm cultivated area (excluding permanent crops and permanent pastures) over 3 years. In the case of a 2-crop rotation, the 2 crops have to be from different plant genus, e.g. a grass plus a legume, or a grass plus a tuber, etc.
6. Livestock includes locally adapted breeds.

B. Criteria for countries with no organic certification systems/schemes:

1. Leaves at least 10% of the holding area for natural or diverse vegetation.
2. The farm does not use medically important antimicrobials as growth promoters.

3. At least two of the following contribute to farm production: 1) temporary crops, 2) pasture, 3) permanent crops, 4) trees on the farm, 5) livestock or animal products, and 6) aquaculture
4. Practices crop or crop/pasture rotation involving at least 2 crops or crops and pastures on at least 80% of the farm cultivated area (excluding permanent crops and permanent pastures) over 3 years. In the case of a 2-crop rotation, the 2 crops have to be from different plant genus, e.g. a grass plus a legume, or a grass plus a tuber, etc.
5. Livestock includes locally adapted breeds

Content of each primary variable:

Criterion #1: Leaves at least 10% of the holding area for natural or diverse vegetation.

1.1 Compute the total agricultural area of the holding to check whether the agricultural holding meets the first criterion:

- Temporary crop outdoors or under low shelters
- Temporary crop under green houses or high shelters
- Temporary fallow
- Temporary meadows and pastures
- Kitchen gardens and backyards
- Permanent crop outdoors or under low shelters
- Permanent crop under green houses or high shelters
- Permanent meadows and pastures.

1.2 Check the total area of the agricultural holding that is left under natural or diverse vegetation, as per listed categories of natural or diverse vegetation

1.3 Calculate the share of the total agricultural area of the holding which is under natural or diverse vegetation. - Then check whether the computed share is greater or lower than the 10 percent of the total agricultural area of the holding as per the formula below.

$$\text{Holding area for natural or diverse vegetation} = \frac{\text{Area agricultural holding under natural or diverse vegetation}_i}{\text{Total agricultural area of the holding}_i}$$

Criterion #2: Check whether the agricultural holding has is producing crops or livestock that are organically certified or undergoing organic certification

Criterion #3: Check whether the agricultural holding meets the third criterion the following two questions are asked

Criterion #4: Check whether the agricultural holding meets the third criterion

4.1 Calculate if the following contribute to farm production 1) temporary crops, 2) pasture, 3) permanent crops, 4) trees on the farm, 5) livestock or animal products, and 6) aquaculture, over the total value of farm production

4.2. Check if each of them represents at least 10 percent of the value of the holding's production.

Criterion #5: Check whether the agricultural holding meets the fourth criterion

Criterion #6: Livestock includes locally adapted breeds

Step 1: classify the agricultural area of the farm according to the following sustainability criteria:

Sustainability status for countries with organic certification systems/schemes:

- Green (desirable): The agricultural holding meets at least three of the criteria (3/6)
- Yellow (acceptable): The agricultural holding meets two of the criteria (2/6)
- Red (unsustainable): The agricultural holding meets none of the criteria (0/6)

Sustainability status for countries with no organic certification systems/schemes:

- Green (desirable): The agricultural holding meets at least two of the criteria (2/5)
- Yellow (acceptable): The agricultural holding meets one of the criteria (1/5)
- Red (unsustainable): The agricultural holding meets none of the criteria (0/5)

Step 2: calculate the proportion of agricultural area for the indicator by sustainability status

Indicators	Area (ha)	Ratio (%)
Desirable	237.49	42.10
Acceptable	172.44	30.60
Unsustainable	154.12	27.30
Total	564.05	100.00

Sub-indicator 9: Wage rate in agriculture

Dimension: Social

Theme: Decent employment

Reference period: last calendar year

Coverage: Not applicable to farms that employ only family labor

Description: It informs about economic risks faced by unskilled workers (those performing simple and routine tasks) in terms of remuneration received, the latter benchmarked against the minimum wage set at the national level in the agricultural sector.

The sub-indicator measures the farm unskilled labor daily wage rate (both monetary and in-kind payments) in Local Currency Units (LCU).

$$\text{Daily wage rate of unskilled hired labor} = \frac{\text{Total annual compensation}}{\text{Total annual hours worked}} * 8 \text{ hour}$$

In case Laos base on, the Department of Labour and Social Welfare has issued Notification No. 1121/LSW dated 25 April 2018 to clarify the GOL announcement of minimum wage increase which is as follows: The employer must pay a minimum wage of LAK1,100,000 per month around 42,000 per day to the employee who works for not more than 26 days per month, 6 days per week and 8 hours per day. This excludes overtime pay and allowances as well as other benefits as agreed by the employer and the employee.

Content of each primary variable:

1. Employees working on the farm and
2. Total daily wage in Section C

Step 1: classify the agricultural area of the farm according to the following sustainability criteria:

Unskilled labor wage rate to national or agriculture sector minimum wage rate. In case there is no national or agriculture sector minimum wage rate, the national poverty line is used instead

- Green (desirable): If the wage rate paid to unskilled labor is **above the minimum national wage rate** or **minimum agricultural sector wage rate** (if available). Default result for farms not hiring labor.
- Yellow (acceptable): if the wage rate paid to unskilled labor is **equal to the minimum national wage rate** or **minimum agricultural sector wage rate** (if available).
- Red (unsustainable): if the wage rate paid to unskilled labor is **below the minimum national wage rate** or **minimum agricultural sector wage rate** (if available).

Step 2 : calculate proportion of agricultural area for the indicator by sustainability status

Indicators	Area (ha)	Ratio (%)
Desirable	491.58	87.20
Acceptable	0.00	0.00
Unsustainable	72.47	12.80
Total	564.05	100.00

Sub-indicator 10: Food Insecurity Experience Scale (FIES)

Dimension: Social

Theme: Food security

Coverage: Only household farms

Reference period: Last 12 months

Description: The Food Insecurity Experience Scale (FIES) produces a measure of the severity of food insecurity experienced by individuals or households, based on direct interviews to eight simple questions regarding their access to adequate food.

Content of the primary variables:

1. "Worried" about not having enough food to eat due to lack of money or other resources
2. "Healthy" was unable to eat healthy and nutritious food because of lack of money or other resources
3. "Few food" Only ate a few kinds of food due to lack of money or other resources
4. "Skipped" a meal because there was not enough money or other resources for food
5. "Ate less" than he/she thought he should due to lack of money or other resources
6. "Ran out" of food because of a lack of money or other resources
7. "Hungry" but not eating due to lack of money or other resources for food
8. "did not eat for a whole day" because of a lack of money or other resources

There are 3 calculation steps;

1. Preparing the data for analysis

Add label to the eight FIES questions and prepare the data collected through the FIES survey module for analysis, each item should be coded

1 is used for a "yes" response. And 2 is used for a "no" response

2. Parameter estimation:

- Item Parameters – refer to and derive from the 8 questions
- Respondent parameters – refer to and derived from the number of people who responded to the questions
- The methodology underlying the estimation of parameters is based on the Item Response Theory (IRT) used to analyze responses to survey questions.
- The IRT is a quantitative measure of a non-observable construction that can be derived from a set of a dichotomous variable
- The IRT measurement model known as the Rasch model provides a theoretical base and a set of statistical tools to apply for the analysis of FIES data.

The below output shows estimates of the parameters from the Rasch model

The raw score is the number of affirmative responses given to the eight FIES questions. This is why the respondents' parameters are nine.

Important note:

An essential point to understand is that every respondent who answers "yes" to the same number of questions will be assigned the same parameter.

The raw scores can only be used as an ordinal measure of food insecurity, meaning that we know that someone with a raw score of 4 is more food insecure than someone with a raw score of 2, but we do not know the exact difference in food insecurity severity between these two respondents.

Once the item severity and raw score parameters have been estimated, a standard metric to derive comparable food insecurity prevalence rates can be derived by filling the estimated parameters excel file developed by the FIES team at FAO

After the parameters have been added to the excel sheet, we get the following output table: The table gives, for each raw score, the probability to be «**moderate + severe** » food insecure and the probability to be «**severe**» food insecure.

Raw score	Percentage of individuals	Probability (mod+sev)	Probability (sev)
0	0.53211	0.00000	0.00000
1	0.18349	0.04052	0.00001
2	0.07798	0.15218	0.00002
3	0.05046	0.41397	0.00009
4	0.03670	0.72868	0.00107
5	0.03670	0.91842	0.01360
6	0.01376	0.98106	0.11732
7	0.01376	0.99413	0.47956
8	0.05505	0.99460	0.75613

Step 3: Calculation of the sustainability status of the agricultural holding

3.1: classify household farms by sustainability status according to the following criteria (level on FIES scale):

- Green (desirable): Mild food insecurity if the probability of a household of the holder of the holding to be moderate to severe food insecure is **less than 0.5** and the probability to be severely food insecure is **less than 0.5**.

- Yellow (acceptable): Moderate food insecurity if the probability of a household of the holder of the holding to be moderate to severe food insecure is **greater than 0.5** and the probability to be severely food insecure is **less than 0.5**
- Red (unsustainable): Severe food insecurity if the probability of a household of the holder of the holding to be severely food insecure is **greater than 0.5**.

3.2: calculate the proportion of agricultural area by sustainability status of the household farm

Indicators	Area (ha)	Ratio (%)
Desirable	480.99	85.30
Acceptable	72.49	12.90
Unsustainable	10.57	1.90
Total	564.05	100.00

Sub-indicator 11: Secure tenure rights to land

Dimension: Social

Theme: Land tenure

Coverage: All farms types

Reference period: last calendar year

Description: The sub-indicator measures the ownership or secure rights overuse of agricultural land areas using the following criteria:

- A formal document issued by the Land Registry/Cadastral Agency
- Name of the holder listed as owner/use right holder on legally recognized documents
- Rights to sell any of the parcels of the holding
- Rights to bequeath any of the parcels of the holding

Content of the primary variables

1. Formal document issued by the Land Registry/Cadastral Agency
2. Name of the holder listed as owner/use right holder on legally recognized documents
3. Rights to sell any of the parcels of the holding
4. Rights to bequeath any of the parcels of the holding

Step 1: classify the agricultural area of the farm according to the following sustainability criteria:

Level of security of access to land:

- Green (desirable): **has a formal document with the name** of the holder/holding on it, or has **the right to sell any of the parcels** of the holding, or has the **right to bequeath any of the parcels** of the holding
- Yellow (acceptable): **has a formal document** even if the **name of the holder/holding is not on it**
- Red (unsustainable): **no positive responses** to any of the 4 questions

Step 2: calculate the proportion of agricultural area for the indicator by sustainability status

Indicators	Area (ha)	Ratio (%)
Desirable	523.60	93.00
Acceptable	2.00	0.40
Unsustainable	37.15	6.60
Total	564.05	100.00

4.2 Key Findings and Issues on the Pilot Survey

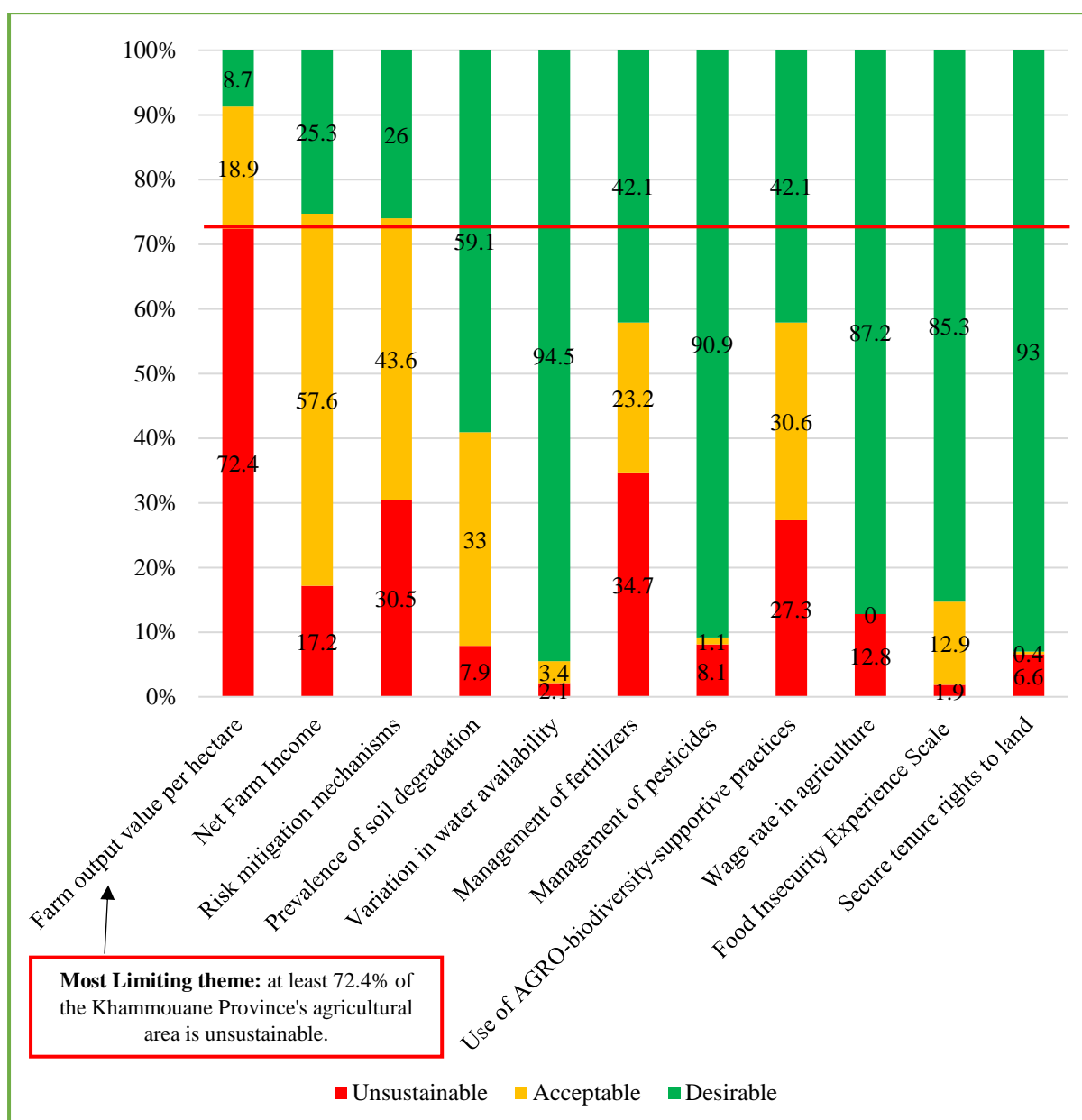
For this survey, the sample size is quite small for Khammouane Province as 218 farm households are only 1.5% of the total 14,419 farm households in Khammouane Province. During enumerations in the rainy season, the condition of roads is very bad, some enumerators go by motorcycle, walking and boats traveling to sample villages and sample household with long-distance and took many hours, the total sample households from this project is 220 households, they can complete interview 218 sample households that mean only 2 households is left because government divide one sample village belong to other province and this village has one sample household and other 1 sample household was the move to another place that did not belong to Khammouane Province. These are the reason why we have not completed 2 sample households in this survey. However, the result from the survey showed that all most farm households cultivated rice around 204 of 218 households, but the yield is quite low, the average yield is 2.18 tones/hectares and the price of paddy rice is also low, the average is 3,284 kip/kg. For the average rice planted area is 1.82 hectares from 204 farm households, we can say that most of the farm households cultivated small rice planted area.

Chapter 5 Conclusion and recommendation

5.1 Conclusion

The result from the survey in Khammouane Province shown that there is only one sub-indicator as Sub-indicator 1: Farm output value per hectare that have a percentage of unsustainable is high cover 72.4% that in line with all most farm households cultivated rice around 204 of 218 households, but the yield is quite low, the average yield is 2.18 tones/hectares and the price of paddy rice is also low, the average is 3,284 kip/kg that effected Sub-indicator 2: Net farm Income, have 57.6% of Acceptable.

Figure 9 the result of 11 sub-indicators



6 sub-indicators have a high percentage of Desirable from 50% to 94% which are Sub-indicator 5: Variation in water availability cover 94.5% that means Khammouane Province was rich in water resources for agricultural production, second is Sub-indicator 11: Secure tenure

rights to land cover 93% that means most of the farm households have the Formal document issued by the Land Registry/Cadastral Agency, Name of the holder listed as owner/use right holder on legally recognized documents, Rights to sell any of the parcels, and Rights to bequeath any of the parcels of their agricultural land. The third is Sub-indicator 7: Management of pesticides cover 90.9% that means most of the farm households were not used much and used in suitable quantity in agriculture that not affect to the health of people and environment. Forth is Sub-indicator 9: Wage rate in agriculture cover 87.2% that means most the labor farm have the wage per day higher minimum wage of, the Department of Labour and Social Welfare has defined in issued the Notification No. 1121/LSW dated 25 April 2018. Fifth is Sub-indicator 10: Food Insecurity Experience Scale (FIES) cover 85.3 % that means most of them can access adequate food, and the last one is Sub-indicator 4: Severance of soil degradation cover 59.1 % that means farmers are very much aware of the state of their soils, health and degradation level.

The other 3 sub-indicators that have a percentage of Desirable less than 50% which are Sub-indicator 3: Risk mitigation mechanisms cover 26 %, Sub-indicator 6: Management of fertilizers cover 42.1 %, and Sub-indicator 8: Use of AGRO-biodiversity-supportive practices cover 42.1 %.

5.2 Recommendations

According to the above results and discussion, to improve the agricultural productivity improvement and promotion of sustainable agriculture of farm households in Khammouane Province, Lao PDR, the following policy recommendations are suggested by this study:

The result of the study had shown that 5 sub-indicators have a percentage of Desirable less than 50%. The government should focus on these sub-indicators and find ways to increase their crop and livestock productivities by introducing new technologies including state-of-the-art equipment and machinery. For example on rice, mechanical transplanter or direct seeder suitable and appreciated rice harvester to reduce the number of laborers and advise them using labors with appropriated farm size.

The government should support and promote farmers in establishing farmer associations or agricultural cooperatives to have a strong bargain power more especially for smallholder farmers. This study revealed that smallholder farmers face challenges like a limitation on accessing finance due to lack of loan collateral and also are weak in competing with big farmers at the market because of low production which leads them to sell at a lower price than the market. Cooperative formation is the solution to this challenge.

The government should organize the training program for the farmers in this survey on how to apply improved crop varieties and use chemical fertilizer on crop cultivation in the appropriate way and suitable amount of size of their planted area to achieve higher productivity.

Furthermore, the government should put more attention to extension services and improving technology in farming, the results of this survey show that both extension services and technology in agriculture are still practiced on a small scale which leads to low production. Engaging in high technology in farming and more access to the farmer on both knowledge and

information in farming can boost the production of crops and livestock in Khammouane Province, Laos. Hence, high profit to the farmers.

This survey uses a calendar year as the survey period, but we would like it to be 12 months (36 months) to match the crop growth stage (June - May) of the country being surveyed and the country's financial year. This is because it is very complicated and confusing for respondents and difficult to obtain accurate data when asking farmers and crop-producing companies about their production and value.

Regarding some definitions such as type of pesticide, chemical fertilizer...etc of the FAO manual, since the definition was not familiar to the Lao people and it was difficult for the enumerators and farmer respondents to understand it. Thus, if the questions are adjusted to the actual situation in Laos, the answers will be smoother and more accurate when the national survey is conducted.

Using CAPI for this pilot survey is helping enumerators to reduce time of keying respondent's answers into the questionnaire and save time on transferring survey data from CAPI to excel tabulation form because the process of converting a paper questionnaire into excel is time-consuming. With these two advantages, the number of human errors will be drastically reduced comparing to PAPI (Pen-and-Paper Personal Interviews) and manual data entry.

On the contrary, disadvantages are the difficulties in merging all data into one file because collected data of questions on main activities carried out by the holding and their production (A.2, A.3, A.4 and A.6) were exported in separated files. In those data files, only the interview id link and list of farmers are shown and also not ordered sequentially as each farmer may have not answered all questions and the number of answers in each question may differ. In the future, this problem might have been solved by keying zero (0) in the CAPI in case some question is not applicable (N/A) instead of leaving it blank or use another software for data analysis such as STATA, Eview, R software which CAPI can export roster question data easily. Also, even though CAPI has reduced time of data entry, there may still be a need for data cleansing as the enumerators may accidentally enter wrong numerical data.

Finally, according to this result, the Government and other donors should continuously be supporting agricultural surveys in the whole country of Laos on SDG indicator 2.4.1 to know the status of sustainable agriculture in Laos, and also promote and improve sustainable agriculture in the future.

Annex



The SAS-PAS

SDG Indicator 2.4.1

Proportion of Agricultural Area under Productive and Sustainable Agriculture

QUESTIONNAIRE

SURVEY INFORMATION

Surveyor first name:..... Surname.....Code:.....
Start time of the survey:..... hour.....minutes, Date.....
Household ID:.....

Section I: INTRODUCTION TO THE SURVEY MODULE AND IDENTIFICATION OF THE HOUSEHOLD

TEXT TO READ:

Hello, my name is ----- . I work for Center for Agricultural Statistics, Department of Planning and Finance, Ministry of Agriculture and Forestry. We collect data that the Government and other stakeholders use for planning purposes. I am visiting you to collect data on your farm. This is part of a worldwide exercise to measure progress in agriculture organised together with the Food and Agriculture Organization of the United Nations. The information you provide will be treated confidentially. It will only be used for statistical purposes and will be put together with responses from other farmers for use in the formulation of programmes and policies to promote more productive and sustainable agriculture. This interview should take approximately one hour. We appreciate your participation in answering these questions. If you have any questions regarding this survey, you are welcome to telephone the number indicated on the visiting card of our organization that I leave for you here. I express my gratitude for your participation in this survey in advance.

Note: Reference time:

- 1 last calendar year: 1 January 2020 to 31 December 2020

- 3 last calendar years: 1 January 2018 to 31 December 2020

I.1 Record the following information about the responden

I.1.1 First name:

I.1.2 Surname:

I.1.3 Sex: ☐ 1 Male ☐ 2 Femal

I.1.4 What is your role on the agricultural holding? (Fill in the most appropriate)

- ☐ 1 Holder (legal and/or economically responsible for the holding) → go to I.2
- ☐ 2 Co-holder (legal and/or economically co-responsible for the holding) → go to I.2
- ☐ 3 Manager (responsible for the day-to-day decisions on the farming operations) → go to I.2
- ☐ 4 Household member working on the holding → go to I.1.5
- ☐ 5 Employee → go to I.1.5
- ☐ 6 Household member not working on the holding → End of the interview
- ☐ Other (specify:.....) → End of the interview

I.1.5 Are you able to answer questions for the agricultural holding?

- ☐ 1 Yes → go to I.2
- ☐ 2 No → End of the interview

I.2 What is the legal status of the holder? (Fill in one circle only)

- ☐ 1 Civil/natural person

- ☐ 2 Group of civil/natural persons
- ☐ 3 Legal person

I.3 What type of holding is this? (Fill in one circle only)

- ☐ 1 Household
- ☐ 2 Non-household

I.4 Address of the holding:

I.4.1 Road:.....

I.4.2 Village.....District.....

I.4.3 Province:.....

I.5 Holding's telephone number:

I.5.1 Telephone number (cell phone):

I.5.2 Telephone number (landline):

I.6 GPS coordinates of the holding:

I.6.1 Longitude:

I.6.2 Latitude:

Section II: AREA OF THE HOLDING

II.1 Report land tenure type of the agricultural area of the holding

Reference year: Last calendar year

(Read all options and fill in all that apply)

- | | |
|--|---------------------|
| <input type="checkbox"/> 1 Owned and operated | Area:..... hectares |
| <input type="checkbox"/> 2 Rented-in | Area:..... hectares |
| <input type="checkbox"/> 3 Other (occupied, borrowed for free, including common land managed by the holding) | Area:..... hectares |
| Total area of the holding: | Area:..... hectares |
| <input type="checkbox"/> 4 Owned and rented-out (not operated by the holding) | Area:..... hectares |

II.2 Report area of the holding by land use.

Reference year: Last calendar year

(Read all options and fill in all that apply)

- | | |
|--|---------------------|
| <input type="checkbox"/> 1a Temporary crops (less than one year or country definition) under greenhouses or high shelters | Area:..... hectares |
| <input type="checkbox"/> 1b Temporary crops (less than one year or country definition) outdoors or under low shelters | Area:..... hectares |
| <input type="checkbox"/> 2 Temporary fallow | Area:..... hectares |
| <input type="checkbox"/> 3 Temporary meadows and pastures | Area:..... hectares |
| <input type="checkbox"/> 4 Kitchen gardens and backyards | Area:..... hectares |
| <input type="checkbox"/> 5a Permanent crops (more than one year or country definition) under greenhouses or high shelters | Area:..... hectares |
| <input type="checkbox"/> 5b Permanent crops (more than one year or country definition) outdoors or under low shelters | Area:..... hectares |
| <input type="checkbox"/> 6 Permanent meadows and pastures | Area:..... hectares |
| Total agricultural area of the holding: | Area:..... hectares |
| <input type="checkbox"/> 7 Farm buildings and farmyards | Area:..... hectares |
| <input type="checkbox"/> 8 Forest and other wooded land | Area:..... hectares |
| <input type="checkbox"/> 9 Aquaculture on the holding (area not counted elsewhere) | Area:..... hectares |
| <input type="checkbox"/> 10 Other area not elsewhere classified (unutilized, rocks, wetlands, including with natural vegetation) | Area:..... hectares |
| Total area of the holding: | Area:..... hectares |

II.3 Report whether the holding uses common area not managed by the holding (i.e. grazing land shared with others)

Reference year: Last calendar year

- ☐ 1 Yes
☐ 2 No

II.4 Do you confirm that the area calculated corresponds to the holding's total area (II.1 = II.2)?

Reference year: Last calendar year

(Fill in one circle only)

- ☐ 1 Yes
☐ 2 No

➔ *back to II.1*

Section A: ECONOMIC DIMENSION OF THE HOLDING

A.1 From an economic perspective, what is the holding's main agricultural focus? *Reference year: Last calendar year*

(Fill in one circle only)

- ☐ 1 Mainly crop production (represents more than 2/3 of the total value of production)
- ☐ 2 Mainly livestock production (represents more than 2/3 of the total value of production) ➡ *skip to A.3*
- ☐ 3 Mix of crop, livestock and other production activities (while each of them represent equal to or less than 2/3 of the total value of production)

A.2 What was the total value of crops and its by-products produced by the holding?

year: Last calendar year

(Fill in all that apply)

Name the 5 main crops and crops by-products produced by the holding and their total value (maximum 5)

No.	Crop name	Area(hactare)	Production(kg)	Price(kip/kg)	Total value(kip)
1					
2					
3					
4					
5					

No.	Crop by-product name	Quantity	Unit	Price(kip/unit)	Total value(kip)
1					
2					
3					
4					
5					

A.3 What was the total value of livestock and its by-products production of the holding?

year: Last calendar year

(Fill in all that apply)

Name the 5 main livestock and livestock products produced by the holding and their total value (maximum 5)

No.	Livestock name	Number of heads at the beginning of the years (Stock + Live births)	Number of heads bought or received during the year	Number of heads given away, dead, or slaughtered during the year	Number of heads sold, paid to labor, rented out or excha during the year	Number of heads at the end of the year	Price(kip/unit)	Total value(kip)
1								
2								
3								
4								
5								

No.	Livestock product name	Quantity	Unit	Price(kip/unit)	Total value(kip)
1					
2					
3					
4					
5					

A.4 For each species of animal (max. 3) that are raised on this agricultural holding, list the different breeds and the number of animals they represent

Reference year: Last calendar year

(Leave it blank if none)

No.	Species Name	Breeds/ Crossbreed Name	Number
1		1.....	
		2.....	
		3.....	
2		1.....	
		2.....	
		3.....	
3		1.....	
		2.....	
		3.....	

A.5 Did the holding carry out other on-farm activities than crops and livestock production? (e.g. aquaculture, agroforestry etc.)

Reference year: Last calendar year

(Fill in one circle only)

☐ 1 Yes

☐ 2 No

➔ go to A.7

A.6 What was the total value of production from other on-farm activities of the holding?

Reference year: Last calendar year

(Fill in all that apply)

Name the main 5 on-farm productions (other than crops and livestock) and their total value (e.g. aquaculture, agroforestry etc.)

No.	Other on-farm products nam	Quantity	Unit	Price(kip/unit)	Total value(kip)
1					
2					
3					
4					
5					

A.7 How often was this holding profitable? (Profitable means that the value of production was greater than total costs, fixed and variable)

Reference year: Last 3 calendar years

(Fill in one circle only)

☐ 1 Unprofitable for all three years

☐ 2 Profitable in one out of the three years

☐ 3 Profitable in two out of the three years

☐ 4 Profitable in three out of the three years

A.8 Did this holding have access to or avail any of the following mechanisms for protection against external shocks?

Reference year: Last calendar year

(Read all options and fill in all that apply)

☐ 1 This holding had access to or availed credit (i.e. formal and/or informal) for protection against external shocks

☐ 2 This holding had access to or availed insurance for protection against external shocks

☐ 3 Neither the holding had access to nor availed any of the above mechanisms for protection against external shocks

A9. Did you household use these things for operated farm?

Reference year: Last calendar year

(Read all options and fill in all that apply)

- ☐ 1 (Smart farm), Green House
- ☐ 2 Good quality seed
- ☐ 3 High technology machinery
- ☐ 4 Clean Agriculture
- ☐ 5 Other specify (.....)
- ☐ 6 Not use anything

Section B: ENVIRONMENTAL DIMENSION OF THE HOLDING

A.1 = 2 Skip B.1 to B.15, if A.1 = 2

B.1 Have you experienced any of the following soil degradation threats on your holding?

Reference year: Last 3 calendar years

(Read all options and fill in all that apply)

- ☐ 1 Soil erosion (loss of topsoil through wind or water erosion)
- ☐ 2 Reduction in soil fertility
- ☐ 3 Waterlogging , including by floods
- ☐ 4 Salinization of irrigated land
- ☐ 5 Other specify:.....
- ☐ 6 None of the above

➔ go to B.3

B.2 What is the total area of the holding affected by any of the threats identified above?

Reference year: Last 3 calendar years

- ☐ Total area affected:.....hectares

B.3 Did this agricultural holding use water to irrigate crops?

Reference year: Last 3 calendar years

(Fill in one circle only)

- ☐ 1 Yes (indicate the area or percentage of the total area of the holding that was irrigated).....ຕື້ນຕາ)
- ☐ 2 No, I don't need irrigation
- ☐ 3 No, I can't afford irrigation
- ☐ 4 No, there is no water available

➔ skip to B.5

➔ skip to B.5

➔ skip to B.5

B.4 Are you observing any reduction in water availability from well or other sources i.e. lake, canal and river?

Reference year: Last 3 calendar years

(Fill in one circle only)

- ☐ 1 No, water is always available in sufficient quantity when I need it
- ☐ 2 Yes, water level in my well(s) is progressively going down
- ☐ 3 Yes, water in river, lake or canal is getting scarce and I can't have reliable supply when I need it
- ☐ 4 I do not know

➔ go to B.6

B.5 Are there organizations dealing with water allocation in the area where this holding is located?

Reference year: Last 3 calendar years

(Fill in one circle only)

- ☐ 1 Yes, and they are working well
- ☐ 2 Yes, but they are not working well (specify why):.....
- ☐ 3 No, there are none
- ☐ 4 I don't know

B.6 Are there organizations dealing with water allocation in the area where this holding is located?

Reference year: Last 1 calendar years

(Fill in one circle only)

- ☐ 1 Yes
- ☐ 2 No

➔ go to B.10

B.7 Are you aware of the environmental risks associated with the excessive use or misuse of fertilizer?

Reference year: Last 1 calendar years

(Fill in one circle only)

- ☐ 1 Yes
- ☐ 2 No

➔ go to B.10

B.8 Did this agricultural holding take specific measures to mitigate the environmental risks associated with the use of synthetic and mineral fertilizers?

Reference year: Last 1 calendar years

(Fill in one circle only)

- ☐ 1 Yes
- ☐ 2 No

➔ go to B.10

B.9 If so, which specific measures did the agricultural holding take or adopt?

Reference year: Last 1 calendar years

(Read all options and fill in all that apply)

- ☐ 1 Follow protocols as per extension service or retail outlet directions or local regulations, not exceeding recommended doses
- ☐ 2 Follow protocols as per extension service or retail outlet directions or local regulations, not exceeding recommended doses
- ☐ 3 Use legumes as a cover crop, or component of a multi/crop or pasture system to reduce fertilizer inputs
- ☐ 4 Distribute synthetic or mineral fertilizer application over the growing period
- ☐ 5 Consider soil type and climate in deciding fertilizer application doses and frequencies
- ☐ 6 Use soil sampling at least every 5 years to perform nutrient budget calculations
- ☐ 7 Perform site-specific nutrient management or precision farming
- ☐ 8 Use buffer strips along water courses.

B.10 Did this agricultural holding use any pesticides for crop or livestock production?

Reference year: Last 1 calendar years

(Fill in one circle only)

- ☐ 1 Yes
- ☐ 2 No

➔ go to B.17

B.11 What type of pesticides did this agricultural holding used?

Reference year: Last 1 calendar years

(Fill in one circle only)

- ☐ 1 Moderately or slightly hazardous
- ☐ 2 Highly, extremely hazardous or illegal pesticides

B.12 Are you aware of the environmental and health risks associated with the use of pesticides?

Reference year: Last 1 calendar year

(Fill in one circle only)

- ☐ 1 Yes

☐ 2 No

B.13 Did this agricultural holding take specific measures to protect people from health-related risks?

Reference year: Last 1 calendar year

(Fill in one circle only)

☐ 1 Yes

☐ 2 No

➔ *go to B.15*

B.14 Which of the following measures did this agricultural holding adopt to protect people from health-related risks?

Reference year: Last 1 calendar year

(Read all options and fill in all that apply)

☐ 1 Adherence to label directions for pesticide use (including use of protection equipment)

☐ 2 Maintenance and cleansing of protection equipment after use

☐ 3 Safe disposal of waste (cartons, bottles and bags)

B.15 Did this agricultural holding adopt specific measures to avoid environment-related risks?

Reference year: Last 1 calendar year

(Fill in one circle only)

☐ 1 Yes

☐ 2 No

➔ *go to B.17*

B.16 Which of the following measures did this agricultural holding adopt in relation to pest control? (plant pest and animal diseases)

Reference year: Last 1 calendar year

(Read all options and fill in all that apply)

☐ 1 Adherence to label directions for pesticide application

☐ 2 Adjustment of planting time

☐ 3 Application of crop spacing

☐ 4 Application of crop rotation

☐ 5 Application of mixed cropping

☐ 6 Application of inter-cropping

☐ 7 Perform biological pest control

☐ 8 Use of biopesticides

☐ 9 Adopting pasture rotation to suppress livestock pest population

☐ 10 Systematic removal of plant parts attacked by pests

☐ 11 Maintenance and cleansing of spray equipment after use

☐ 12 Use one pesticide no more than two times or in mixture in a season to avoid pesticide resistance.

B.17 In this agricultural holding, are there areas covered by natural or diverse vegetation? including one or a combination of the following:

Reference year: Last 1 calendar year

(Read all options and fill in all that apply)

☐ 1 Natural pasture or grasslands

☐ 2 Wildflower strips

☐ 3 Stone or wood heaps

☐ 4 Trees or hedgerows

☐ 5 Natural ponds or wetlands

☐ 6 None of the above

B.18 What is the total area of the holding covered by any of the natural or diverse vegetation identified above? (Please cross-check with II.2)

Reference year: Last 1 calendar years

☐ Total area covered:.....Hectare

B.19 Are you using medically important antimicrobials as growth promoter for your livestock?

Reference year: Last 1 calendar year

(Fill in one circle only)

- ☐ Yes
☐ No
☐ I don't know

B.20 What is the percentage of the agricultural area on which crop rotation or crop/pasture rotation involving at least two different crops/pastures of two different plant genus is practiced?

Reference year: Last three calendar years

(Leave it blank if not practiced)

☐ Percentage of agricultural area:.....%

B.21 Did the holding produce crops and/or livestock that are certified organic or under going the organic certification process during the reference period?

- ☐ Yes
☐ No

➡ go to C.1

B.22 Answer the following questions about the holding's organic certification

- ☐ Report the holding's Organic Registration Number:.....
☐ Report the name of the certifying body:.....

Section C: SOCIAL DIMENSION OF THE HOLDING

C.1 Did this agricultural holding hire any worker for carrying out simple and routine tasks?

Reference year: Last calendar year

(Fill in one circle only)

- ☐ 1 Yes
☐ 2 No

➡ go to C.3

C.2 How much did this agricultural holding pay on average in cash and/or in-kind to a worker performing simple and routine tasks per day (of 8 hours)?

Reference year: Last calendar year

(Read all options and fill in all that apply)

- ☐ 1 Daily average wage in local currency units:.....kip
☐ 2 Daily average wage paid in-kind and converted in local currency units:.....kip

(Skip questions C.3 to C.10 if the answer to question 1.3 was 2)

C.3 During the last 12 months, was there a time when you (or any other member in the household) were worried that you would not have enough food to eat because of a lack of money or other resources?

Reference year: Last 12 months (Fill in one circle only)

- ☐ 1 Yes
☐ 2 No
☐ 3 I don't know
☐ 4 I don't want to answer

C.4 Still thinking about the last 12 months, was there a time when you (or any other member in the household) were unable to eat healthy and nutritious food because of a lack of money or other resources?

Reference year: Last 12 months (Fill in one circle only)

- ☐ 1 Yes
- ☐ 2 No
- ☐ 3 I don't know
- ☐ 4 I don't want to answer

C.5 Was there a time when you (or any other member in the household) ate only a few kinds of foods because of a lack of money or other resources?

Reference year: Last 12 months (Fill in one circle only)

- ☐ 1 Yes
- ☐ 2 No
- ☐ 3 I don't know
- ☐ 4 I don't want to answer

C.6 Was there a time when you (or any other member in the household) had to skip a meal because there was not enough money or other resources to get food?

Reference year: Last 12 months (Fill in one circle only)

- ☐ 1 Yes
- ☐ 2 No
- ☐ 3 I don't know
- ☐ 4 I don't want to answer

C.7 Still thinking about the last 12 months, was there a time when you (or any other member in the household) ate less than you thought you should because of a lack of money or other resources?

Reference year: Last 12 months (Fill in one circle only)

- ☐ 1 Yes
- ☐ 2 No
- ☐ 3 I don't know
- ☐ 4 I don't want to answer

C.8 Was there a time when your household ran out of food because of a lack of money or other resources?

Reference year: Last 12 months (Fill in one circle only)

- ☐ 1 Yes
- ☐ 2 No
- ☐ 3 I don't know
- ☐ 4 I don't want to answer

C.9 Was there a time when you (or any other member in the household) were hungry but did not eat because there was not enough money or other resources for food?

Reference year: Last 12 months (Fill in one circle only)

- ☐ 1 Yes
- ☐ 2 No
- ☐ 3 I don't know
- ☐ 4 I don't want to answer

C.10 During the last 12 months, was there a time when you (or any other member in the household) went without eating for a whole day because of a lack of money or other resources?

Reference year: Last 12 months (Fill in one circle only)

- ☐ 1 Yes
- ☐ 2 No
- ☐ 3 I don't know
- ☐ 4 I don't want to answer

C.11 Does the holder/holding have a formal document for any of the agricultural land that it holds (alternatively 'possess, use, occupy) issued by the Land Registry/Cadastral Agency?

Reference year: Last 12 months (Fill in one circle only)

- ☐ 1 Yes
- ☐ 2 No
- ☐ 3 I don't know
- ☐ 4 I don't want to answer

C.12 Is the name of the holder or any other member of the holding is listed as an owner or use right holder on any of the legally recognized documents?

Reference year: Last 12 months (Fill in one circle only)

- ☐ 1 Yes
- ☐ 2 No
- ☐ 3 I don't know
- ☐ 4 I don't want to answer

C.13 Does the holder/holding have the rights to sell any of the parcel of the holding (alternatively 'parcel possessed, used or occupied')?

Reference year: Last 12 months (Fill in one circle only)

- ☐ 1 Yes
- ☐ 2 No
- ☐ 3 I don't know
- ☐ 4 I don't want to answer

C.14 Does the holder/holding have the rights to bequeath any of the parcel of the holding (alternatively 'parcel possessed, used or occupied')?

Reference year: Last 12 months (Fill in one circle only)

- ☐ 1 Yes
- ☐ 2 No
- ☐ 3 I don't know
- ☐ 4 I don't want to answer

END OF THE SURVEY

End time of the survey::.....hour,minute



**Food and Agriculture
Organization of the
United Nations**

SDG Indicator 2.4.1

Enumerators Manual **(Farm Survey Module)**

12/16/2019

Note: This enumerator manual was prepared in support to the farm survey data collection on SDG indicator 2.4.1 and has been revised in light of the cognitive tests conducted in Mexico, Kenya and Bangladesh in year 2018-19.

List of Acronyms:

AGRIS Agricultural Integrated Survey

EGM Expert Group Meeting

FAO Food and Agriculture organization of the United Nations

FIES Food Insecurity Experience Scale

GHS Globally Harmonized System on Classification and Labelling of Chemicals

GSARS Global Strategy to improve Agricultural and Rural Statistics

HHPs Highly Hazardous Pesticides

ILO International Labor Organization

NSO National Statistical Office

IPM Integrated Pest Management

IRT Item Response Theory

ISCO International Standard Classification of Occupations

ISIC International Standard Industrial Classification of the United Nations

SDGs Sustainable Development Goals

WCA World Programme for the Census of Agriculture

SEEA System of Environmental-Economic Accounting -Central Framework

UN United Nations

UNESCO United Nations Educational, Scientific and Cultural Organisation

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Introduction:

This Enumerator Manual is developed to help enumerators and supervisors to administer the survey module designed for SDG indicator 2.4.1. It provides a detailed description of the survey instrument and reviews Standard Operating Procedures for each question. The purpose of this manual is to ensure that there is a common understanding of questions and response codes by all enumerators and supervisors.

Briefly, it details the following issues:

- Rationale behind inclusion of a particular module in the survey
- Definition of terms and the meaning behind the questions asked
- Guidance on the use of SKIP questions and FILTER questions
- Examples of commonly encountered instances where questions and responses may not be easy to administer and record respectively

The SDG indicator 2.4.1 “proportion of agricultural area under productive and sustainable agriculture” is measured using a farm survey. In this respect FAO has developed SDG 2.4.1. farm survey questionnaire specifically designed to collect information on SDG 2.4.1. The questionnaire consists of bear minimum questions and be administered standalone or customised to be attached as a module or integrated at appropriate places within current surveys at appropriate places. The ultimate objective of the survey module is to collect information on 11 different themes and sub-indicator that constitute the framework of SDG 2.4.1 at the agricultural holding level (details are given in table 1).

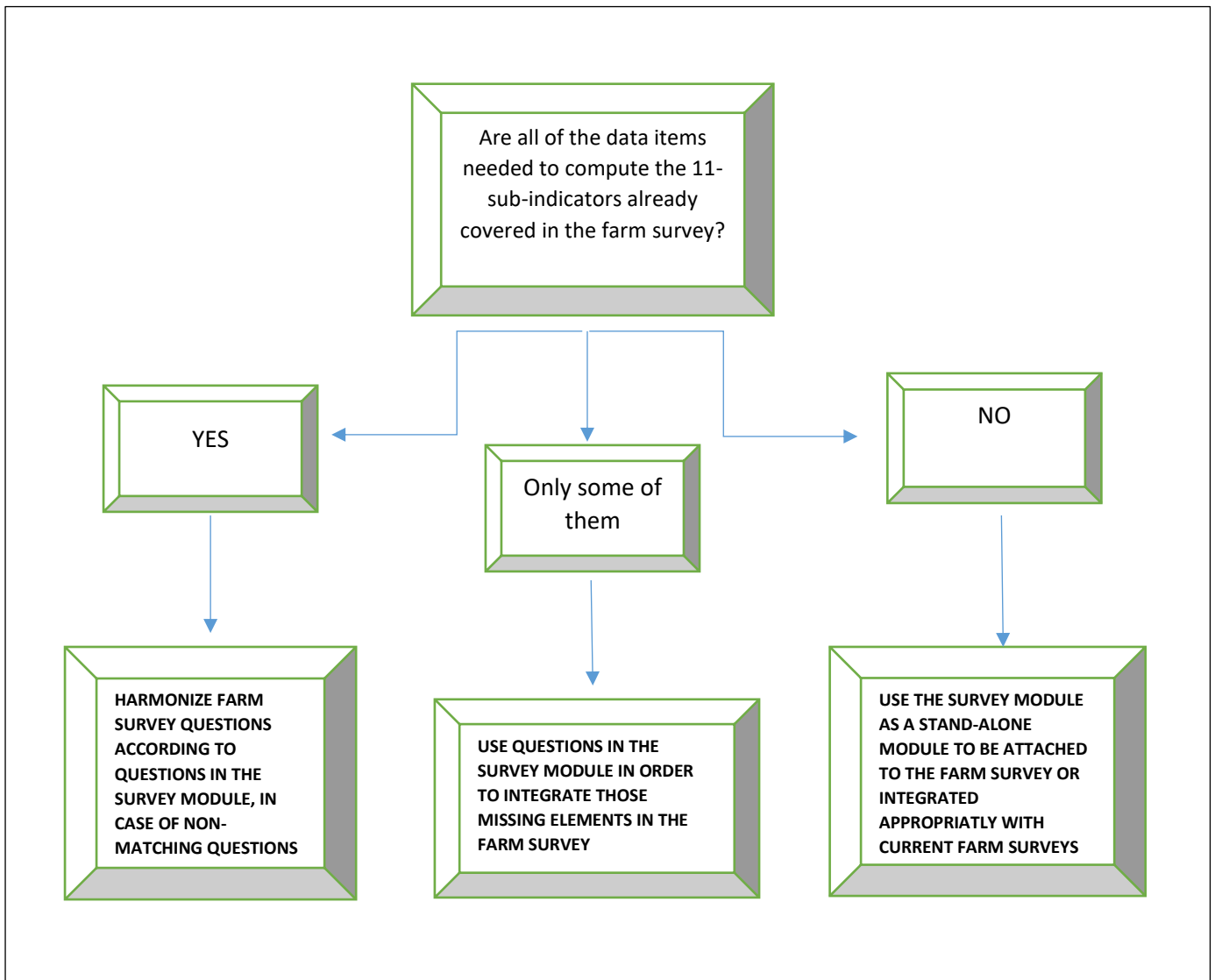
Table 1. List of themes and sub-indicators

No.	Themes	Sub-indicators
1	Land productivity	Farm output value per hectare
2	Profitability	Net farm income
3	Resilience	Risk mitigation mechanisms
4	Soil health	Prevalence of soil degradation
5	Water use	Variation in water availability
6	Fertilizer pollution risk	Management of fertilizers
7	Pesticide risk	Management of pesticides
8	Biodiversity	Use of agro-biodiversity-supportive practices
9	Decent employment	Wage rate in agriculture
10	Food security	Food Insecurity Experience Scale (FIES)
11	Land tenure	Secure tenure rights to land

This document is structured as follows: Section I presents the way survey questionnaire is organized and structured, as well as the main concepts attached to the module itself. Section II details each of the questions in the survey module; it clarifies the meaning underlying each questions and the way enumerators should record the corresponding information, which question to ask next and which question is to be skipped.

As highlighted above, the survey questionnaire can be integrated into existing farm surveys, either by 1) attaching the module itself to the farm survey, as a standalone module; or 2) by extracting from the module those missing elements that are not included or covered by existing farm survey. The diagram below summarizes the way the survey module can be used.

The possible ways the survey module can be used:



The questionnaire is comprised of 5 sections (i.e. I, II, A, B and C) and one additional introductory section to record information on the enumerators details (to be prefilled by the enumerators). Each section within the module collect information on the 11-sub-indicators across the three dimensions as per table 2 below.

Table 2. Structure of the questionnaire:

Sections	
Survey Preparation	
Section I	Introduction to the survey module and identification of the holding and holder
Section II	Area of the holding
Section A	Economic dimension of the holding
Section B	Environmental dimension of the holding
Section C	Social dimension of the holding

Data collected using the module are primarily structured at the agricultural holding level (the unit of observation for this indicator). Nonetheless, some of the information, particularly on agricultural production, are collected at the product level and is associated with the holding, thus leading to a greater degree of specificity of the agricultural holding itself (see section II).

Specifications:

1. Confidentiality: It is necessary that before starting the interview the enumerators ensure respondents that the information collected will remain strictly confidential. It is worth noting that in order to protect the confidentiality of respondents and their answers and sensitive information (i.e. information on the identification of the respondents and on the location of the agricultural holdings) will be hidden and removed from publicly available datasets.
2. Questions must be asked exactly as worded; changing words or phrases, adding or dropping words to a question must be avoided. Also, unless in case of a skip pattern, a question must always be asked, even when the answer is obvious to the interviewer: writing an answer without asking the question must be avoided at any time.
3. Each section of the module contains a specific recall period according to which the information is collected. The recall period is clearly expressed in the upper-left side of each section, as per example below:

A.5	Did the holding carry out other on-farm activities than crops and livestock? (Read the list)		
	Reference year:	Last calendar year	
	(Fill in one circle only)		
	<input type="radio"/>	1	Yes
	<input type="radio"/>	2	No
	→ Go to A.7		

4. Most of the questions refer to the last calendar year prior to the date of the interview. Some sections, however, make reference to the last three calendar years. The last calendar year is a period of 12 months from January 1 to December 31. For example, if data collection is done in May 2018, the last calendar year will be from January 1, 2017 to December 31, 2017. Similarly, the last 3 calendar years will be from January 1, 2015 to December 31, 2017. Important to note is that questions from C.3 to

C.10, i.e. question capturing information on Food Security are asked, instead, with reference to the last 12 months prior to the date of the interview.

The following sub-sections are meant to guide enumerators through the questions of this survey module. Each of the three sub-sections contains explanation on the meaning and content of questions, including which questions to ask next, and which questions are to be skipped.

Survey Preparation:

This section is mainly pre-filled. Before going to the field, the enumerators write his/her first name, surname, surveyor number, and start time and date of the survey.

Make sure you properly record the holding identification number before starting with the interview.

Section I: Introduction to the Survey module and identification of the holding and holder

This section records information about the respondent and the holding. It is important to accurately fill the information on the location of the holding. This will help in reaching out to the respondent in the future to check and correct potential misreported values (if needed).

TEXT TO READ:

TEXT TO READ:

Hello, my name is -----, I work for the -----, We collect data that the Government and other stakeholders use for planning purposes. I am vising you to collect data on your farm. This is part of a worldwide exercise to measure progress in agriculture organised together with the Food and Agriculture Organization of the United Nations. The information you provide will be treated confidentially. It will only be used for statistical purposes and will be put together with responses from other farmers for use in the formulation of programmes and policies to promote more productive and sustainable agriculture. This interview should take approximately one hour. We appreciate your participation in answering these questions.

If you have any questions regarding this survey, you are welcome to telephone the number indicated on the visiting card of our organization that I leave for you here.
I express my gratitude for your participation in this survey in advance.

Before starting the interview, the enumerators must go through the TEXT TO READ and introduce confidently and give time for the respondent to ask questions (if any) before proceeding with the interview. Enumerators should first explain to the respondent the reasons why s/he is administering the survey and, in simple terms, how the respondent's agricultural holding has been pre-selected. It is important that the enumerator also assure the respondent that personal responses will not be disclosed, the information will be processed by a computer and statistical information produced will only be used in aggregated form.

I.1 Record the following information about the respondent:

I.1 identifies the respondent and is further broken down into three parts from **I.1.1** to **I.1.3**.

I.1 Record the following information about the respondent

I.1.1 First name

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

I.1.2 Surname

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

I.1.3 Sex of the respondent

- ☐ 1 Male
☐ 2 Female

I.1.1 First name:

Record the first name of the selected respondent.

I.1.2 Surname name

Record the surname name of the selected respondent.

I.1.3 Sex

Record the sex of the selected respondent. Codes for sex are 1 for male and 2 for female.

I.1.4 What is your role on the agricultural holding?

This question is aimed at identifying the function of the respondent within the agricultural holding.

I.1.4 What is your role on the agricultural holding?

(Fill in the most appropriate)

- | | | |
|-------------------------|--|------------------------|
| <input type="radio"/> 1 | Holder (legal and/or economically responsible for the holding) | → Go to I.2 |
| <input type="radio"/> 2 | Co-holder (legal and/or economically co-responsible for the holding) | → Go to I.2 |
| <input type="radio"/> 3 | Manager (responsible for the day-to-day decisions on the farming operations) | → Go to I.2 |
| <input type="radio"/> 4 | Household member working on the holding | → Go to I.1.5 |
| <input type="radio"/> 5 | Employee | → Go to I.1.5 |
| <input type="radio"/> 6 | Household member not working on the holding | → End of the interview |
| <input type="radio"/> 7 | Other (specify <input type="text"/>) | → End of the interview |

The codes for the respondents are:

1. Holder (legal and/or economically responsible for the holding);
2. Co-holder (legal and/or economically co-responsible for the holding);
3. Manager (responsible for the day-to-day decisions on the farming operations);
4. Household member working on the holding;
5. Employee;
6. Household member not working on the holding;
7. Other (specify).

In order to collect reliable information on the agricultural holding, enumerators are recommended to select the holder or co-holder of the agricultural holding as respondents of the survey (i.e. **Codes 1 and 2**), since they are likely to be the most well informed individuals about the agricultural activities of the holding.

Important notes: In case the selected respondent is:

1. Manager of the agricultural holding (i.e. **code 3**):

Enumerators do not ask questions in section C from C.3 to C.10 (on Food security). Enumerators proceed by recording information on all other questions in the survey.

2. Household member working on the holding (i.e. **code 4**).

Enumerators further ask whether (or not) the household member working on the holding is able to answer questions related to the agricultural holding as well as household of the holder. This check is operationalized in the survey by asking question **I.1.5** to the household member working on the holding: “are you able to answer questions for the agricultural holding”? **If not, enumerators select another respondent and re-start the interview.**

3. Employee working on the holding (i.e. **code 5**):

Enumerators further ask whether (or not) the employee working on the holding is able to answer questions related to the agricultural holding. This check is operationalized in the survey by asking by asking question **I.1.5** to the selected employee: “are you able to answer questions for the agricultural

holding?” If not, enumerators select another respondent and re-start the interview. In case of positive answer, instead, the interview should continue, but enumerators should not ask questions in section C from C.3 to C.10 (on Food security).

4. Household member not working on the holding (code 6) or another respondent (code 7), the **enumerators will re-start the interview** after having reached another person who is more informed about the activities and characteristics of the agricultural holding.

I.1.5 Are you able to answer questions for the agricultural holding?

- ☐ 1 Yes
☐ 2 No

→ Go to I.2
→ End of the interview

This Yes/No question is only asked to respondent whose function in the agricultural holding is “Household member working on the holding” (Code 4 in question I.1.4) or “Employee” (Code 5 in question I.1.4). This question ascertains whether (or not) the selected respondent is well-informed about economic, social and environmental aspects of the agricultural holding. In case the respondent says “No” (Code 2), enumerator must find another more informed respondent and re-start the interview, ideally holder, co-holder or manager of the holding.

I.2 What is the legal status of the holder?

(Fill in one circle only)

- ☐ 1 Civil person/natural person
☐ 2 Group of civil persons/natural persons
☐ 3 Legal person

The question collects information on the legal status of the holder, and, depending on the legal status, three codes are associated to three different options:

1. Civil person / natural person
2. Group of civil person/natural person
3. Legal person

Box 1 provide the definition for the above-mentioned three legal statuses of the holder (Source: Handbook on the Agricultural Integrated Survey - AGRIS, GSARS, 2017)¹.

¹ <http://gsars.org/wp-content/uploads/2018/05/AGRIS-HANDBOOK-completo-02-24.pdf>

Box 1: Legal status of the holder

Civil (natural) person:

In this case, one woman or man is legally, socially and economically responsible for her or his independent activity of production, and can be clearly identified by her or his name, surname and date of birth. Most often, this person is also technically responsible, although in some cases, a manager may be in charge of the day-to-day decisions or more (what to sow, when to sell, etc.). However, agricultural holdings whose holder has this legal status may fall outside the household sector if they behave as corporations and sell the main part of their production

Group of civil (natural) persons:

In this case, several civil persons (as defined above) have decided to pool means of production, totally or partially, to benefit each one of them. It generally concerns two or three persons; exceptionally, six or seven persons may be involved. These persons are collectively responsible for the holding. In some cases, these holdings are not within the household sector because the association between several holders (not living in the same household) must be registered under national legislation. Finally:

Legal person:

In this case, some natural and/or legal persons share the capital stock of a private company. This may also be a public company or a similar entity, such as a corporation, a cooperative, a governmental institution or a church. This form of organization falls outside of the household sector. The status involves formal registration according to the applicable national legislation.

I.3 What type of holding is this?

(Fill in one circle only)

- ☐ 1 Household
- ☐ 2 Non-household

This question collects information on the type of operating holding, which must be adapted to existing national legal status and therefore should be established according to country-specific characteristics. The type of holding can be household or non-household, depending on the country-specific criteria that define a holding type. Box 2 below provides details on the main concepts underlying the legal status of the holding (Source: Handbook on the Agricultural Integrated Survey - AGRIS, GSARS, 2017). This question is asked to distinguish between holdings in the **HOUSEHOLD SECTOR** and holding in the **NON-HOUSEHOLD** sectors. Two approaches can be adopted according to the criteria listed below:

1. **Holdings in the Household sector** are those where the holder is a civil (natural) person or group of civil (natural) persons.
2. **A combination of the legal status of the holder and the holding** is used to refine the limits between the household and non-household sector holdings.

Box 2: Legal status of the holding

As per AGRIS recommendations (pg. 108)¹, the legal status of the holding must be adapted to a list of national existing legal statuses. The sector to which the holding belongs may be classified as “**Household sector**” or “**Non-household sector**”. The Household and Non-Household sectors can be defined using a combination of Q.I.2 and Q.I.3 categories, depending on the national context. A clear distinction between both sectors is crucial as many of the subsequent questions will be filtered through these two categories.

The System of National Account (SNA) 2008 defines the Household and Non-Household sectors from a production perspective as follows: (i) households without production activity; (ii) households with unincorporated enterprises; and (iii) households with quasi-corporations. Only households with unincorporated enterprises are included in the household sector, while those with quasi-corporations are classified in the non-household sector. The below definition are taken from the SNA 2008:

- **Unincorporated household enterprises** (UNSD, 2009, p. 4.155 to 4.156) Households may undertake agricultural activities and produce agricultural products for their own consumption, for barter, and for the market. They can range from a single person to a large enterprise employing people outside the household. The unincorporated household enterprise can also include partnerships where the partners belong to different households. When the liability of the partners for the debts of the enterprises is unlimited, the partnership must be treated as an unincorporated enterprise and remain within the household sector, as all of the assets of the household, including the dwelling itself, are at risk if the enterprise goes bankrupt. Partnerships whose partners enjoy limited liability are effectively separate legal entities and are treated as corporations.
- **Household with quasi-corporation** (UNSD, 2009, p. 4.42–4.43 and 4.156–4.157) The SNA 2008 (UNSD, 2009, p. 4.42–4.43 and 4.156–4.157) recognizes the existence of households as quasi-corporations. All household enterprises that can be treated as quasi-corporations are classified in the corporation sector and are therefore excluded from the household sector. These are households with agricultural activities which are operated and behave like privately owned corporations, even if they are not effectively separated legal entities. They should be treated as quasi-corporations provided that complete sets of accounts are available or can be compiled if requested.

I.4 Address of the holding

I.4 Address of the holding

I.4.1 Address (street)

I.4.2 Village, town

I.4.3 Region

This question is self-explanatory and is meant to collect information on the address i.e. town, (alternatively village or city) and region in which the holding is located.

I.5 Holding's number

I.5.1 Telephone number (cell phone) . . .

I.5.2 Telephone number (landline) . . .

Enumerators record the holding's phone number (i.e. cell phone and landline).

I.6 GPS coordinates of the holding

1.6.1 Longitude	.	.	.	.	.	.	.	.	.
1.6.2 Latitude	.	.	.	.	.	.	.	.	.

Enumerators record the GPS coordinates of the agricultural holding using a smart phone or GPS device (if available). If devices for obtaining GPS coordinates are not provided to enumerators, this information must be obtained by enumerators before going to the field, by accurately recording the longitude and latitude related to the centre of gravity of the holding (location at the centre of the agricultural area of the holding). If the holding's buildings are at the centre of the holding, the coordinates of the farm building can be used.

It is important to accurately record the longitude and latitude of the area of the holding, in order for the enumerators to reach out to the respondent again in the future in case of misreported values.

Section II: AREA OF THE HOLDING

This section collects information on the area of holding. Total area of holding is derived by summing the areas under each of the land use categories and under each land tenure arrangement. Data on land tenure types are collected at a holding level.

Introduction to question II.1-II.4. Questions from II.1 to II.4 collect information on the total area of the holding by land use type and land tenure type, including information on common land that are exclusively managed by the holding. It is important to notice that common land is included in the scope insofar as it is occupied exclusively (i.e. managed and used) by the agricultural holding.

II.1 Report land tenure type of the agricultural area of the holding

Reference year: Last calendar year
(Read all options and fill in all that apply)

		Area of the holding				Unit of measure
<input type="radio"/>	1 Owned and operated . . . . .				.
<input type="radio"/>	2 Rented-in . . . . .				.
<input type="radio"/>	3 Other (occupied, borrowed for free, including common land managed by the holding) . . . . .				.
Total area of the holding					.	
<input type="radio"/>	4 Owned and rented-out (not operated by the holding) . . . . .				.

Land tenure refers to the arrangements or rights under which the holder operates the land that makes up the holding. This question refers to whether the agricultural holding is operated under specific land tenure types. A holding may have one or more tenure types.

Respondent should first inform the enumerators about each **land tenure type of the holding**. For each of them, it is then asked to record the area of the holding under a specific land tenure type, as previously specified. Four main types of land tenure arrangements are identified:

1. Owned and operated (code 1);
2. Rented-in (code 2);
3. Other (occupied, borrowed for free, etc.) (code 4)
4. Owned and rented-out (code 3); and

The last column of question II.1 is used to record the unit of measurement according to which the area, under a specific land tenure type.

Once all information has been recorded, enumerators must calculate, in a block note, the total area of the holding by adding up the area that is owned and operated (code 1), rented-in (code 2) and other (code 3).

The area of the holding that is rented-out is recorded but subtracted from this calculation as these areas are not operated by the holding. Enumerators must record the total area of the holding by adding up the area from code 1, 2 and 3.

Box 3 below contains a definition of Land Tenure Type (FAO, 2010), whereas Box 4 and Figure 1 define the area of the holding with breakdown by parcels of land.

Box 3: Land tenure type

The 4 main types of land tenure arrangements identified are:

1. **Owned and operated:** The holder or members of the holder's household possess title of ownership, which gives the holder the right to sell/mortgage/lease and determine the nature and extent of the use of the land parcels.
2. **Rented-in:** The land is held under conditions that enable it to be operated as if legally owned by the holder or members of the holder's household. This type of legal owner-like possession is where land is operated under long or short-term lease, with nominal rent.
3. **Other (occupied, borrowed for free, etc.):** The holder has operated the land without interruption for a long period without any form of legal ownership, title, long-term lease, or payment of rent or the land is operated under a system in which a rent-free land is received and retained as long as it is kept under cultivation by the recipient's personal and household labor, but which cannot be sold or mortgaged.

The above three types of land tenure arrangements make up the total agricultural area of the holding. However, the agricultural holding may rent out some of the land owned by the holding to someone else:

4. **Owned and rented-out:** Rented land to someone else means land that is rented or leased out by the holding to other persons/holdings, usually for a limited time period. Rental arrangements can short or long term and may take different forms. Land may be rented for an agreed sum of money and/or produce, for a share of the produce, or in exchange for services. Land may also be granted rent free.

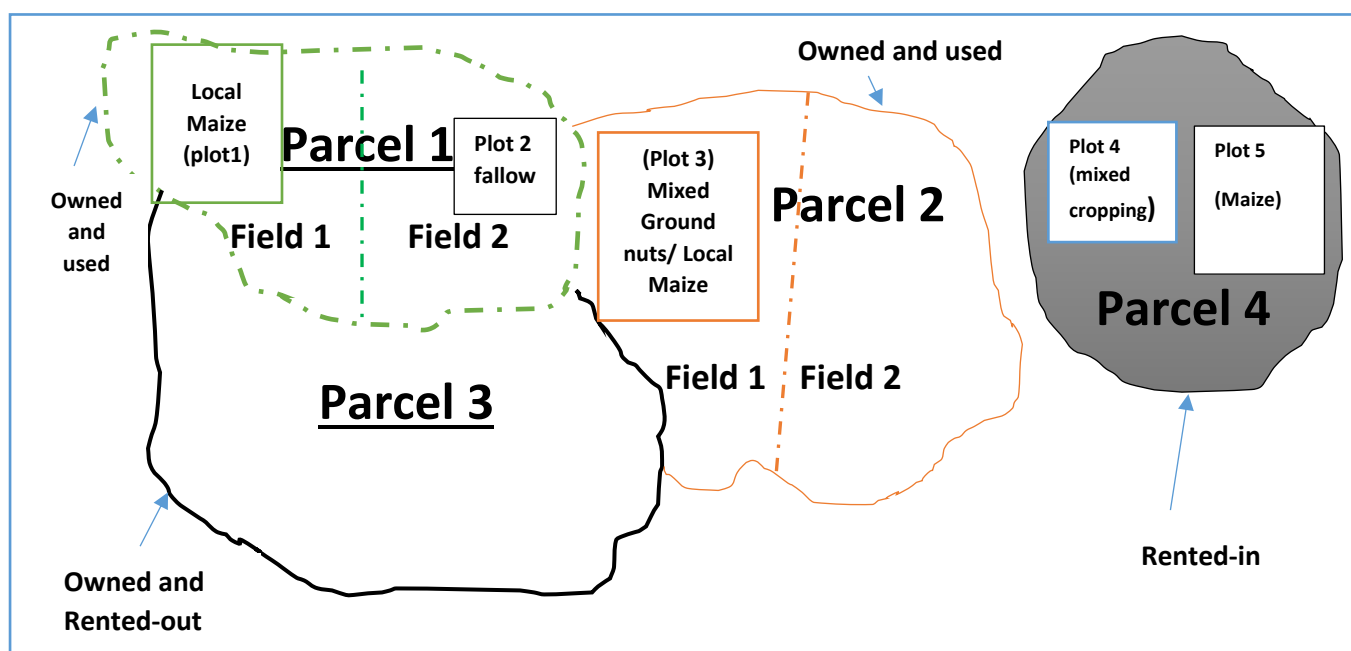
Box 4: Area of the holding by land tenure type

For the purposes of this questionnaire, a holding is divided into different land areas depending on the land tenure type under which a given land area is recorded. For each type of land tenure arrangement, interviewer must first write down all the land tenure type (e.g. owned, rented-in etc.) and then record the corresponding area under a given land tenure type (including the corresponding standard or non-standard unit of measurement).

In general, the agricultural area of the holding can be divided into parcels. A parcel is any piece of land, of one land tenure type, entirely surrounded by other lands, water, road, forest or other features not forming part of the holding or forming part of the holding under a different land tenure type. A parcel may consist of one or more fields or plots adjacent to each other. This implies that a distinction should be made between a parcel, a field and a plot. A field is a piece of land in parcel separated from the rest of the parcel by easily recognizable demarcation lines, such as paths, cadastral boundaries and/or hedges. A field may consist of one or more plots, where a plot is a part or whole of a field on which a specific crop or crop mixture is cultivated. Figure 1 below shows the total area of a given agricultural holding. Assuming that 2 parcel are owned (parcel 1 and 2), a third parcel is rented out (parcel 3) and a fourth parcel is rented-in, interviewer will report that total area owned as calculated by adding up the land size of parcel 1 and 2. The total **agricultural** area of the holding will also be comprised of the fourth parcel, the one rented-in. The area of the holding which is rented-out, instead, is made up of parcel 3 but will not be part of the total agricultural area of the holding. Therefore:

Total agricultural area of the holding = Parcel 1 + Parcel 2 + Parcel 4

Figure 1: Example of calculation of the total agricultural area of the holding



II.2 Report area of the holding by land use

Reference year: Last calendar year

(Read all options and fill in all that apply)

- ☐ 1a Temporary crops (less than one year) under greenhouses or high shelters
- ☐ 1b Temporary crops (less than one year) outdoors or under low shelters
- ☐ 2 Temporary fallow
- ☐ 3 Temporary meadows and pastures
- ☐ 4 Kitchen gardens and backyards
- ☐ 5a Permanent crops (more than one year) under greenhouses or high shelters
- ☐ 5b Permanent crops (more than one year) outdoors or under low shelters
- ☐ 6 Permanent meadows and pastures

Total agricultural area of the holding

- ☐ 7 Farm buildings and farmyards
- ☐ 8 Forest and other wooded land
- ☐ 9 Aquaculture on the holding (area not counted elsewhere)
- ☐ 10 Other area not elsewhere classified (unutilized, rocks, wetlands, including with natural vegetation)

Total area of the holding

Area of the holding

Unit of measure

This question is asked with reference to the last calendar year to collect information on the total area of the holding disaggregated by land use type. The land use classes proposed in this questionnaire are harmonized with the land use classification of the System of Environmental-Economic Accounting-Central Framework (SEEA, 2012) and World Programme for the Census of Agriculture 2020 (WCA, 2020). Some adaptation of those classes in light of agricultural land use was introduced to better capture all types of land used for crop production.

For each type of land use by the holding, enumerators record the total area and the corresponding unit of measurement in the first and second column of question II.2 respectively. The breakdown of the total area of the holding by land use type is as follows (codes are next to each land use type):

- 1a Temporary crops (less than one year) under greenhouses or high shelters
- 1b Temporary crops (less than one year) outdoors or under low shelters
- 2 Temporary fallow
- 3 Temporary meadows and pastures

- 4 Kitchen gardens and backyards
- 5a Permanent crops (more than one year) under greenhouses or high shelters
- 5b Permanent crops (more than one year) outdoors or under low shelters
- 6 Permanent meadows and pastures
- 7 Farm buildings and farmyards
- 8 Forest and other wooded land
- 9 Aquaculture on the holding (area not counted elsewhere)
- 10 Other areas not elsewhere classified (unutilized, rocks, wetlands, including with natural vegetation)

Codes from 1a to 6 are used to calculate the agricultural area of the farm. It is important to know that the land area of the holding that is not cultivated but is covered by natural or diverse vegetation falls under the category of “**Other areas not elsewhere classified**” (Code 10).

It is important to accurately collect the total area under a given land use type (see box 5). The aggregation of the agricultural land area associated with codes from 1 to 6 is used to calculate the denominator of sub-indicator 1: farm output value per hectare of land. Box 5 and 6 below provides a description of each land use type as per WCA, 2020.

Box 5: Definitions of land use types

The below Land Use Classification is based on the World Programme for the Census of Agriculture 2020 (WCA 2020) and harmonized with the System of Environmental-Economic Accounting (SEEA)-Central Framework, designed for covering the whole territory of a country. For the purposes of this survey, a slight adaptation was carried out in order to keep Greenhouses and Land in family gardens (both permanent and temporary) as a sub-category of lands under temporary/permanent crops. It is recommended that the above 10 basic land use classes are identified and listed in the survey. **It is important for the interviewers to get familiar with the classification of land use types and explain it to respondents. A definition of each land use types is as follows:**

1. **Land under temporary crops** includes all land used for crops with a less than one-year growing cycle; that is, they must be newly sown or planted for further production after the harvest. Some crops that remain in the field for more than one year may also be considered temporary crops. For example, strawberries, pineapples and bananas are considered to be annual crops in some areas. Such crops could be classified as temporary or permanent according to the custom in the country.
2. **Land under temporary meadows and pastures** includes land temporarily cultivated with herbaceous forage crops for mowing or pasture. A period of less than five years is used to differentiate between temporary and permanent meadows and pastures. If country practice differs from this, the country definition should be clearly indicated in census reports.
3. **Land temporarily fallow** refers to arable land at prolonged rest before re-cultivation. This may be part of the holding's crop rotation system or because the normal crop cannot be planted because of flood damage, lack of water, unavailability of inputs or other reasons.
4. **Land under permanent crops** refers to: land cultivated with long-term crops which do not have to be replanted for several years; land under trees and shrubs producing flowers, such as roses and jasmine; and nurseries (except those for forest trees, which should be classified under "forest and other wooded land"). Land under permanent meadows and pastures is excluded from land under permanent crops.
5. **Land under permanent meadows and pastures** includes land used permanently (for five years or more) to grow herbaceous forage crops, through cultivation or naturally (as wild prairie or grazing land). Whether land under permanent meadows and pastures is cultivated or naturally grown has important environmental implications.
6. **Land under farm buildings and farmyards** refers to surfaces occupied by operating farm buildings (hangars, barns, cellars, silos), buildings for animal production (stables, cow sheds, sheep pens, poultry yards) and farmyards. Area under the holder's house (including the yard around it) is also classified here if it makes up part of the agricultural holding
7. **Forest land** is land spanning more than 0.5 ha with trees higher than 5 metres (m) and a canopy cover of more than 10 percent, or trees that are able to reach these thresholds in situ. It covers both natural and plantation forests. It includes forest roads, firebreaks and other small open areas, as well as areas that are temporarily not under trees (due to clear-cutting as part of forest management practice, abandoned shifting cultivation or natural disasters) but are expected to revert to forest within five years (in exceptional cases, local conditions may justify the use of a longer time frame). Windbreaks, shelterbelts and corridors of trees with an area of more than 0.5 ha and width of more than 20 m are included. Forest tree nurseries that form an integral part of the forest should be included. **Other wooded land** is land spanning more than 0.5 ha with: (i) trees higher than 5 m and a canopy cover of 5 to 10 percent, or trees able to reach these thresholds in situ; or (ii) trees not able to reach a height of 5 m in situ but with a canopy cover of more than 10 percent (e.g. some alpine tree vegetation types, arid zone mangroves, etc.); or (iii) combined cover of shrubs, bushes and trees of more than 10 percent.
8. **Area used for aquaculture** includes area (land, inland waters or coastal waters) for aquaculture facilities, including supporting facilities. Aquaculture refers to farming of aquatic organisms such as fish, molluscs, crustaceans, plants, crocodiles, alligators and amphibians. Farming implies some form of intervention in the rearing process to enhance production, such as regular stocking, feeding, protection from predators, etc.
9. **Other area not elsewhere classified** includes all other areas on the holding that are not elsewhere classified. It includes uncultivated land producing some kind of utilizable vegetable product, such as reeds or rushes for matting and bedding for livestock, wild berries, or plants and fruit. It also includes land which could be brought into crop production with a little more effort than that required for common cultivation practices. Also included under this category: land occupied by non-farm buildings; parks and ornamental gardens; roads or lanes (except forest roads, which are included in forest); open spaces needed for storing equipment and products; wasteland; land under water not used for aquaculture; and any other area not reported under previous classes (such as marshlands, wetlands, etc.)

Box 6: Definitions of land use types

The nine land use classes can be grouped as follows:

Land use classes	Aggregated land classes			
1.Land under temporary crops	Arable lands	Crop land	Agricultural land	Land used for agriculture
2.Land under temporary meadows and pastures				
3.Land temporarily fallow				
4.Land under permanent crops				
5. Land under permanent meadows and pastures				
6. Land under farm buildings and farmyards				
7. Forest and other wooded land				
8. Area used for aquaculture				
9.Other area not elsewhere classified				

Box 7: Measuring the land area

It is important to know that total area of holding is the area of all the land making up the agricultural holding. It includes all land operated by the holding without regard to title or legal form. **Thus, land owned by members of a household but rented to others should not be included in the area of the holding. Conversely, land not owned by members of a household but rented from others for agricultural production purposes should be included in the holding area.** In this question it is also asked non-agricultural areas of the holding, i.e. forest and other wooded land and area used for aquaculture which, despite not being used for agricultural purposes, belong to the holding.

Note that the area of holding may be zero, such as where the holding keeps livestock but has no land; this is called a landless holding.

In this question, interviewers will ask the farmer to estimate the size of the land area that belong to the holding itself over the last agricultural season, both agricultural and non-agricultural area. Interviewers make sure not to include the area which is rented out. The estimate of the total agricultural and non-agricultural area of the holding must reconcile with the total area of the holding which is owned, rented-in and other type of land tenure arrangement (which is not rented out), as per question A.1.

Many smallholders are likely to give areas as acres and as fractions of acres, probably not more detailed than $\frac{3}{4}$, $\frac{1}{2}$, and $\frac{1}{4}$ of an acre. Interviewers **MUST** convert the fractions to decimals as follows: $\frac{3}{4}=0.75$, $\frac{1}{2}=0.50$ and $\frac{1}{4}=0.25$, and fill in the areas with two decimals. Interviewers **MUST** make sure that the decimals are correctly registered in order to avoid data entry errors at a later stage. Note the following conversions:

1 acre \cong 4000m² \cong 0.4 hectares

1 hectare \cong 10,000m² \cong 2.5 acres

If any local area measurement unit is used, it should be converted into acres before and then into hectares; and finally recorded in the last column. The following guidelines can be used:

- An acre is a measure on the ground of approximately 70 yard (yd) x 70 yd or half a standard football field;
- By casually walking round a square of 50 steps by 50 steps, one covers an area of approximately $\frac{1}{4}$ or 0.25 acres;
- An area measuring 22 yd x 22 yd covers 0.1 acres; and
- An area measuring 16 yd x 16 yd covers 0.05 acres.

II.3 Report whether the holding uses common areas not managed by the holding (i.e. grazing land shared with others)

Reference year: Last calendar year

- ☐ 1 Yes
☐ 2 No

Common lands are defined as those lands used collectively by a number of persons, or by one person, but over which other people may have certain traditional rights, such as livestock grazing. Common lands are usually owned by the State, by local communities, etc.

This question is asked with reference to the last calendar year. It collects information on total area of the holding which is under common use. Enumerators record information on the common land area when used exclusively and managed by the holding.

It is important to record only those common lands that are exclusively managed by the holding and not those used by different agricultural holdings without any management arrangement.

II.4 Do you confirm that the area calculated corresponds to the holding's total area (II.1=II.2)?

Reference year: Last calendar year

(Fill in one circle only)

- ☐ 1 Yes
☐ 2 No → Go back to II.1

This Yes/No question ascertains whether the holding's total area recorded by the enumerators corresponds to the effective area of the holding, as reported in questions II.1 and II.2.

More specifically, this question is asked to double check whether the actual area of the holding corresponds to the total recorded area of the holding. This filter question allows for a Yes/No answer. In case of negative answer, enumerators go back to Section II and ask again questions from II.1 to II.4, making sure to properly record information on land use type and tenure. In case of positive answer, the enumerators proceed with the interview and ask questions in **section A**.

Section A: Economic dimension of the holding

This section collects information on the agricultural production and provides a measure of the holding's economic situation. Information on the agricultural production (in monetary value) and other on-farm production, i.e. production that is not strictly agriculture related but linked to the holding's agricultural activities (e.g. processing of agricultural products) are recorded in this section, which is made up of 8 questions.

Introduction to question A.1-A.6. Questions from **A.1** to **A.6** collect information on crop and livestock harvested and produced quantities during the reference period. It also provides information on the main agricultural activity of the holding and it allows deriving the total value of agricultural production of the holding, including the value of production from other on-farm activities. Filter questions are added in order to avoid unnecessary burden to respondents.

A.1 From an economic perspective, what is the holding's main agricultural focus?

Reference year: Last calendar year

(Fill in one circle only)

- ☐ 1 Mainly crop production (represents more than 2/3 of the total value of production)
- ☐ 2 Mainly livestock production (represents more than 2/3 of the total value of production) → Go to A.3
- ☐ 3 Mix of crop, livestock and other production activities (while each of them represent equal to or less than 2/3 of the total value of production)

This question aims to collect information on the main activities carried out by the holding over the last calendar year. It is important to ask about the main activities in terms of monetary value produced, not time spent. It might be the case that a given holding carried out two activities: the first one, say crop activity, is the one in which the person (holder) spend more time but it produces less monetary value than the one in which less time is spent (say livestock activity). In this case the main agricultural focus will be the one producing a greater monetary value, irrespective of time spent on the activity. Three codes are associated with this question

1. Mainly crop production (represents more than 2/3 of the total value of production)
2. Mainly livestock production (represents more than 2/3 of the total value of production)
3. A mix of crop and livestock production (while each of them represents equal to or less than 2/3 of the total value of production)

Enumerators skip question **A.2** if the main agricultural focus of the holding is livestock (code 2). Yet, enumerators skip question **A.3** if the main agricultural focus of the holding is crop (code 1). In case of holdings focusing on both livestock and crop activities (mixed production) enumerators will ask both question **A.2** and question **A.3**.

The definitions of crop and livestock activities, as per classification provided by the UN-ISIC (International Standard Industrial Classification of the United Nations) are given in Box 8. The definitions of sub-crop activities by ISIC are illustrated in Box 9. Finally, the definitions of sub-livestock activities are in Box 10.

Box 8: Definition of major crop and livestock

According to the International Standard Industrial Classification (ISIC revision 4) of the United Nations (UN), Agricultural activities are mainly of two types: crop activities and livestock activities. The interviewer must ascertain that the respondent is familiar with the concept of crop and livestock production as per below example:

- ✓ The production of crop products: covering also the growing of genetically modified crops-- include growing of non-perennial crops and perennial crops, such as growing of cereals, leguminous crops and oil seeds in open fields, including those considered organic farming and the growing of genetically modified crops etc. Further typologies of crop production include growing of rice vegetables and melons, roots and tubers; growing of sugar cane, growing of tobacco; and finally growing of fibre crops.
- ✓ The production of animal products --covering also the raising of genetically modified animal—include raising of cattle and buffaloes; raising of horses and other equines; raising of camels and camelids; raising of sheep and goats; raising of swine/pigs; raising of poultry; and finally raising of other animals. Products derived from raising one or more of the above animals are also included in the livestock production.
- ✓ Mixed farming; i.e. mix of crop and livestock production, breaks with the usual principles for identifying main activity. It accepts that many agricultural holdings have reasonably balanced crop and animal production and that it would be arbitrary to classify them in one category or the other.

Available at: <https://unstats.un.org/unsd/cr/registry/regcst.asp?Cl=27>

Box 9: Definitions of key terms (Crops)

- ✓ **Production of annual field crops (cereals, oilseeds, protein crops, root crops, tobacco, cotton, etc.):**
This group includes the growing of perennial crops, i.e. plants that lasts for more than two growing seasons, either dying back after each season or growing continuously. Included is the growing of these plants for the purpose of seed production.
- ✓ **Production of vegetables, mushrooms, flowers, ornamental plants, etc.**
This class includes the production of all vegetative planting materials including cuttings, suckers and seedlings for direct plant propagation or to create plant grafting stock into which selected scion is grafted for eventual planting to produce crops.
This class includes:
Growing of plants for planting
Growing of plants for ornamental purposes, including turf for transplanting
Growing of live plants for bulbs, tubers and roots; cuttings and slips; mushroom spawn
Operation of tree nurseries, except forest tree nurseries
- ✓ **Production of grapes for wine**
Growing of wine grapes and table grapes in vineyards
- ✓ **Production of other perennial crops (cacao, coffee, etc.)**
This class includes:
Growing of rubber trees
Growing of Christmas trees
Growing of trees for extraction of sap
Growing of vegetable materials of a kind used primarily for plaiting
- ✓ **Mixed cropping (no dominance of a specific crop activity)**
Country level definition may be used.

Box 10: Definitions of key terms (Livestock)

✓ **Raising ruminant livestock for meat (cattle, sheep goats)**

This class includes:

- raising and breeding of cattle, buffalo, sheep, goat, etc.

✓ **Raising non-ruminant livestock for meat (pigs, poultry, etc.)**

This class includes:

- raising and breeding of poultry:

✓ **Production of eggs**

Self-explanatory

✓ **Production of milk**

Self-explanatory

✓ **Mixed livestock (no dominance of a specific livestock activity)**

Country level definition may be used_

A.2 What was the total value of crops and its by-products produced by the holding?

Reference year: Last calendar year

(Fill in all that apply)

Name the 5 main crops and crops by-products produced by the holding and their total value (maximum 5)

	Crop name	Area	Unit of measure	Quantity Produced	Quantity unit of measure	Average or latest Price per unit	Total Value of Production
<input type="radio"/> 1							
<input type="radio"/> 2							
<input type="radio"/> 3							
<input type="radio"/> 4							
<input type="radio"/> 5							

	Crop by-products name	Quantity Produced	Quantity unit of measure	Average or latest Price per unit	Total Value of Production
<input type="radio"/> 1					
<input type="radio"/> 2					
<input type="radio"/> 3					
<input type="radio"/> 4					
<input type="radio"/> 5					

This question collects information on total value of crop and its by-products, which is total quantity of each crop and by-product produced multiplied by its respective average or last farm gate price. Total monetary value of crops and by-product is obtained by adding up the total monetary value of all the crops (and its by-product) harvested by the holding. This question also collects information on the area used for a given crop and the number of varieties of the same crop on a given area.

In question **A.2**, enumerators will fill in two tables. The first one is meant to record the quantity and corresponding prices of crops produced by the holding. The second records the quantity and prices of its by-product produced. Data is collected on maximum of five crops and five by-products.

In question **A.2**, each row refers to one crop or by-product. If the holding grows multiple crop commodities, they should be listed separately (for example, maize and beans will be on different rows).

NOTE. Question A.2 is about crop and its by-products. Do not include livestock animal and its by-products. Skip this question if the main agricultural focus of the holding is livestock (code 2 in question A.1)

- List up to 5 major crops produced by the holding (1st column).
- Report area used to cultivate the listed crops (2nd column).
- Record the unit of measurement of the area used for each crop (3rd column).
- Quantity produced for each crop (4th column).
- Unit of measurement of the quantity produced for each crop (5th column).
- Average or last farm gate price (6th column). The price must be aligned with the unit of measurement used to record the quantity of a specific crop and/or by-products (e.g. price per Kg, grams, etc.). In case the crop or its by-products are self-consumed, implicit price are used as if the commodities were sold in the market.
- Total value of production in local currency unit (7th column).

Box 11: Crops

Comprehensive list of crop commodities needs to be established at the country level. Nonetheless, list of crop commodities can be extracted from the ISIC rev.4 classification, see table below:

Crops	
Avocado	Orange
Banana	Paprika
Beans.	Pawpaw/papaya
Cabbage	Peach.
Cassava	Pearl millet
Coffee	Pigeon pea
Cotton	Pineapple
Custade apple	Rice
Finger millet	Sorghum
Fodder trees	Soybean
Ground bean	Sugar cane
Groundnut.	Sunflower
Guava	Sweet potato
Lemon	Tanaposi
Maize	Tea
Mango	Tobacco
Mexican apple	Tomato
Naartje (tangerine)	Wheat
Onion	Other (specify)

Example: Crop by-products:

Wheat - Stalks
Rice – Straw / Husk
Cotton – Sticks
Sugar cane – Tops
Maize – Stalks / Straw
Mustard – Straw

A.3 What was the total value of livestock and its products production of the holding?

Reference year: Last calendar year

(Fill in all that apply)

Name the 5 main livestock and livestock products produced by the holding and their total value (maximum 5)

	Livestock animal name	Number of heads at the beginning of the years (Stock + Live births)	Number of heads bought or received during the year	Number of heads given away, dead, or slaughtered during the year	Number of heads sold, paid to labor, rented out or exchanged during the year	Number of heads at the end of the year	Average or latest Price per unit	Total Value of Production
<input type="radio"/> 1								
<input type="radio"/> 2								
<input type="radio"/> 3								
<input type="radio"/> 4								
<input type="radio"/> 5								

	Livestock product name	Quantity Produced	Quantity unit of measure	Average or latest Price per unit	Total Value of Production
<input type="radio"/> 1					
<input type="radio"/> 2					
<input type="radio"/> 3					
<input type="radio"/> 4					
<input type="radio"/> 5					

This question is asked with reference to the last calendar year and records information on total value of livestock production, which is the quantity of each animal sold (or its by-products) multiplied by the corresponding average or last farm gate prices. Total value of livestock production is obtained by adding up the monetary value of each single livestock and its by-product produced by the holding.

In question **A.3**, enumerators will fill in two tables. The first one is meant to record the number of animals owned by the holding. The second one records the amount of products that are produced by the raising of different types of animals.

Table 1 of question A.3 (Livestock animals' names):

Each row refers to one animal owned by the holding. If the holding has multiple animals, they should be listed separately in each row (for example, cattle, goat etc.).

NOTE. Table 1 of question **A.3** is about livestock animals. **Do NOT include livestock by-products.** Skip this question if the main agricultural focus of the holding is crop (**code 1 in question A.1**)

The enumerators begin by asking the respondent for the number of each type of [ANIMAL] owned by the holding as of start date of the last agricultural year. **If additional animals have been added within the last calendar year, they should be included in the count. If animals have been sold or slaughtered during the past calendar year, they should be excluded.**

- List up to 5 major livestock animals (first column). The enumerator must begin by asking the respondent to break down the number of animals owned by species.
- Number of animals born in the last agricultural year (second column).
- Number of animals received as a gift or bought (third column).
- Number of animals died and slaughtered (fourth column).
- Number of animals sold, used as pay or wages for labor, given to landlord as rent or given for other reasons or exchanged (fifth column).
- Average or last market price per head of animal. In case animals were not sold over the last agricultural year, an implicit farm gate price **should be used. This is done by asking the respondent "what would have been the price if you had sold that animal"?**
- Total value of production of the livestock is recorded in the last column.

Table 2 of question A.3 (Livestock products):

Each row refers to one livestock product produced. If the holding has produced multiple products by the raising of animals, they should be listed in separate rows (e.g. milk, eggs, etc.).

NOTE. Table 2 of question A.3 is about livestock product. **Do NOT include livestock animals.** Skip this question if the main agricultural focus of the holding is crop (code 1 in question A.1)

- Enumerators begin by asking the respondent to list up to five major livestock products (first column).
- The amount of products produced by the raising of animals over the last calendar year prior to the date of the interview is recorded in the second column.
- These measurements should be in standard international units (such as litres or kilograms), not in local units.
- Once the amount of products has been recorded the respondent should inform the enumerator about the average or last farm gate price of each product – recorded in local currency unit – in the last calendar year. The price must be aligned with the unit of measurement used to record the amount of animal products produced by the holding (e.g. price per kilograms, grams, litres, etc.)

Box 12: Livestock animals and by-products

In general, a comprehensive list of livestock animals and livestock products must be established at the country level, taking into account country specificities. Nonetheless, list of livestock animals and livestock products can be extracted from the ISIC rev.4 classification, as per the below table:

Livestock animals	Livestock by-products
Calf	Milk
Steer/heifer	Chicken eggs
Cow	Guinea fowl eggs
Bull	Meat
Ox	Skins and hides
Donkey/mule/horse	Manure
Goat	Other (specify)
Sheep	
Pig	
Chicken-layer/	
Chicken-broiler	
Local-hen	
Local-cock	
Turkey/guinea fowl	
Duck	
Dove/pigeon	
Other (specify)	

A.4 For each species of animal (max. 3) that are raised on this agricultural holding, list the different breeds and the number of animals they represent

Reference year: Last calendar year
(Leave it blank if none)

		Species Name	Breeds/Crossbreed Name	Number of animals
<input type="radio"/>	1	. . . . .	1	
		. . . . .	2	
		. . . . .	3	
<input type="radio"/>	2	. . . . .	1	
		. . . . .	2	
		. . . . .	3	
<input type="radio"/>	3	. . . . .	1	
		. . . . .	2	
		. . . . .	3	

This question is asked with reference to the last calendar year. In this question enumerators must record all of the animal species that belong to the holding in the first column. For each animal species, the different breeds are reported in the second column, with the corresponding total number of each breed are recorded in the third column. The percentage can be calculated accordingly. The example in Box 13 below clarifies how data should be collected and recorded. It is important to report only the national list or locally adopted breeds, as agreed with country experts.

Note: if no animals are raised in the holding, enumerators must leave question **A.4** blank

Box 13: Definitions of key terms

According to FAO (<http://www.fao.org/dad-is/en/>), there are around 8 800 livestock breeds of 38 different species in the world, providing a diversity of products and services.

Table below provides the list of animal species from the Domestic Animal Diversity Information System (DAD-IS) of FAO. For each animal species, each country has its own animal breeds.

Alpaca	Horse
American Bison	Llama
Ass	Nandu
Bactrian camel	Partridge
Buffalo	Peacock
Cassowary	Pheasant
Cattle	Pig
Chicken	Pigeon
Chilean Tinamou	Quail
Deer	Rabbit
Dog	Sheep
Dromedary	Turkey
Duck	Vicuna
Emu	Yak
Goat	
Goose	
Guanaco	
Guinea fowl	

The following example is extracted from the list of animal species and breeds in Malawi, using information available at <http://www.fao.org/dad-is/browse-by-country-and-species/en/>.

	Species Name	Breeds/ Crossbreed Name	Number of heads	%
○ 1	Cattle	1 Boran	3	
		2 Friesian	4	
		3 Simmental	10	
○ 2	Chicken	1 Ross	21	
		2 Ross Indian River	4	
		3 Tokai	1	
○ 3	...	1		
		2		
		3		

A.5 Did the holding carry out other on-farm activities than crops and livestock production? (e.g. aquaculture, agroforestry etc. read the list)?

Reference year: Last calendar year

(Fill in one circle only)

- ☐ 1 Yes
☐ 2 No

→ Go to A.7

The objective of this Yes/No question is to collect information on whether (or not) the holding has diversified its agricultural activities (as identified in question A.2 and A.3: crop and livestock) by carrying out activities that, despite not being of agriculture type, are strongly associated to the main crop and/or livestock activities of the holding. On-farm activities that are not crops and livestock generally comprise of on-farm processing of agricultural products (e.g. manufacture of crude vegetable oil: olive oil, soybean oil, palm oil, sunflower seed oil, cottonseed oil, rape, colza or mustard oil, linseed oil, etc.).

Box 14 below lists all on-farm activities carried out by the holding and which are not crop or livestock production. Enumerators must read out the below on-farm activities after having asked question A.5

The following codes are associated with question A.5. Skip question A.6 if code in A.5 is 2 (No).

- 1 Yes
2 No

Box 14: Other On-farm activities

Other on-farm activities may represent a substantial share of the holding's activities (in terms of income). The question is limited to the holding's activities and excludes the activities of household members and/or external workers carried out outside of the holding. A comprehensive list of relevant activities is illustrated below.

1. On-farm processing of agricultural products:
• Grain milling: production of flour, groats, meal or pellets of wheat, rye, oats, maize (corn) or other cereal grains
• Rice milling: production of husked, milled, polished, glazed, parboiled or converted rice; production of rice flour
• Processing and preserving of fruit and vegetables
• Manufacture of crude vegetable oil: olive oil, soya bean oil, palm oil, sunflower seed oil, cottonseed oil, rape, colza or mustard oil, linseed oil, etc.
• Manufacture of wine
• Distillation of spirit drinks
• Manufacture of tobacco products (cigars, chewing tobacco, etc.)
• Processing and preserving meat
• Manufacture of dairy products
• Manufacture of leather and related products
2. Selling of holding's products at the market/shop (incl. preparation, packaging and transport of processed products)
3. Production of forestry products
4. Production, processing and preserving of fish, crustaceans and molluscs
• Production of fish, crustaceans and molluscs
• Processing and preserving of fish, crustaceans and molluscs
5. Production of renewable energy
6. Contractual work for other holdings using the production means of this holding
7. Accommodation, restaurant, catering and other leisure/educational activities
8. Making handicrafts
9. Training of animals
10. Management and/or administration for the agricultural holding
11. Other (specify)
12. None

A.6 What was the total value of production from other on-farm activities of the holding?

Reference year: Last calendar year

(Fill in all that apply)

Name the main 5 on-farm productions (other than crops and livestock) and their total value (e.g. aquaculture, agroforestry etc.)

	Other on-farm products name	Quantity Produced	Quantity unit of measure	Average or latest Price per unit	Total Value of Production
<input type="radio"/> 1					
<input type="radio"/> 2					
<input type="radio"/> 3					
<input type="radio"/> 4					
<input type="radio"/> 5					

This question collects information on total value of production from other on-farm, which is the quantity of each on-farm products multiplied by the corresponding average or last farm gate price. Total value of on-farm production is obtained by adding up the monetary value of each single on-farm product produced by the holding over the last calendar year. In question **A.7**, each row refers to one on-farm product.

NOTE. Question A.6 is about on-farm products. Do NOT include crops, livestock animal and its products. Skip this question if the code in question A.5 is 2 (no) and go to A.7.

- Enumerators must begin by listing up to 5 major on-farm products produced by the holding (first column).
- In the second column, records unit of measurement.
- The third column records the quantity produced of each listed on-farm product
- Fourth column capture the average or last farm gate price for each on-farm product. The price must be aligned with the unit of measurement used to record the quantity of commodities (e.g. price per Kg, grams etc.). In case some on-farm products were only own-consumed, the recorded price should be the price if those products would have been sold in the market.
- The last column records the total value of production.

The list of on-farm products is given in box 15 below.

Box 15: Example of other On-Farm Products

Production of:	Flour
Production of:	Meal
Production of:	Pellets of wheat
Production of:	Rye
Production of:	Oats
Production of:	Maize
Production of:	Other cereal grains
Production of:	Husked
Production of:	Milled
Production of:	Polished
Production of:	Glazed
Production of:	Parboiled or converted rice
Production of:	Production of rice flour
Production of:	Fruit
Production of:	Vegetables
Manufacture of:	Olive
Manufacture of:	Vegetable oil
Manufacture of:	Soybean
Manufacture of:	Palm
Manufacture of:	Sunflower
Manufacture of:	Cottonseed
Manufacture of:	Wine
Manufacture of:	Tobacco
Manufacture of:	Dairy products
Manufacture of:	Leather
Processing and preserving:	Meat

Introduction to Question A.7. Question A.7 records information on profitability of the holding. Such information is meant to measure, monitor and assess the economic performance of the holding over the past three calendar years.

A.7 How often was this holding profitable? (Profitable means that value of production was greater than total cost both fixed and variable)

Reference year: Last 3 calendar years

(Fill in one circle only)

- ☐ 1 Unprofitable for all three years
- ☐ 2 Profitable in one out of the three years
- ☐ 3 Profitable in two out of the three years
- ☐ 4 Profitable in three out of the three years

This question is asked to record information on how many times over the past 3 calendar years prior to date of the interview the agricultural holding made profit. The concept of profit implies that the total revenues were greater than fixed and variable costs of production, as per below formula.

$$\pi_i = (\text{Revenue i. e. } p_i * q_i) - (\text{total cost of production}_i) \quad [1]$$

Where π_i is the profit of the i – th holding, $(p_i * q_i)$ is the revenue of the holding (farm gate prices multiplied by quantity produced). A profitable holding implies that the difference between revenues and cost of production is non-negative (either 0 or greater than 0).

The enumerators should ask question A.7 carefully and record the information on how often the agricultural holding was profitable. The enumerators should ensure the total cost of production also comprises the fixed and variable costs associated with production. Three codes are possible for this question:

- 1 **Unprofitable for all three years**
- 2 **Profitable in one out of the three years**
- 3 **Profitable in two out of the three years**
- 4 **Profitable in three out of the three years**

Box 16: Definition of key terms

Profitable agricultural holdings are those having a positive profit. Profitability here is measured using **Net farm income** that the holding is able to earn from farming operations. The focus of **Net farm income** sub-indicator is on income from farming operations as opposed to total income of the holding household which may include income from other sources e.g. employment in local businesses by other family members, tourism activity, etc. While these other sources of income are important in the context of assessing the sustainability of living in rural areas, they are not of direct relevance in the assessment of the sustainability of agriculture.

Gross farm income refers to the monetary and non-monetary income received by farm. Its main components include cash receipts from the sale of farm products, direct program payments to producers, other farm income (such as income from custom work), value of food and fuel produced and consumed on the same farm, and change in value of year-end inventories of crops and livestock.

Net farm income refers to the return (both monetary and non-monetary) to farm operators for their labor; management and capital, after all production expenses have been paid (that is, Gross Farm Income minus production expenses). It includes net income from farm production, the value of commodities consumed on the farm, depreciation, and inventory changes.

In order to make sure that respondents are aware about the distinction between **Gross** and **Net farm income** (i.e. profit), interviewers can ask again how many times during the past 3 years the value of products sold was greater than the total operating cost of the business. Further, interviewers can ask how much did the holding spend on all operating expenses during year 1, 2 and 3 and write the corresponding value of expenses in a block note. In the same way, interviewers ask how much did the holding received during years 1, 2 and 3 in monetary value form sales of the all commodities produced. The Net farm income can be calculated as the difference between self-reported sales and self-reported total operating expenses.

Estimating profitability at a farm level will generally require compilation of basic farm financial records, i.e. daily, weekly, monthly or seasonal transactions in an organized way. In general, large commercial farms maintain detailed financial records however, in case of medium farms and small subsistence agriculture, record keeping is seldom practiced and in most of the countries it doesn't exist at all. Where the detailed data ideally required are not available at farm level especially in case of small holders and household sector, then:

- Estimates will be developed based on farmer declaration of outputs and inputs quantity (and appropriate prices) and/or sales and purchases.
- Depreciation, variation in stocks and taxes will be neglected in this case.

Box 16 (cont'd): Definition of key terms

If the required information is available, Net farm income is better calculated according to the methodology developed by Statistics Canada (available at <https://www150.statcan.gc.ca/n1/en/pub/21-010-x/21-010-x2014001-eng.pdf?st=8V1ikX6>). The following formula is applied:

$$NFI = CR + Y_k - OE - Dep + \Delta In \quad [1]$$

Where:

- **NFI = Total Net Farm Income**
- **CR = Total farm cash receipts including direct program payments**
- **Y_k = Income in kind**
- **OE = Total operating expenses after rebates (including costs of labor)**
- **Dep = Depreciation charges**
- **ΔIn = Value of inventory change.**

The below table enlists all costs and revenues associated with agricultural production, as per formula 1 above.

Total revenues = Total farm cash receipts + Direct program payments + Income in kind + Change in inventory	Cost = Operating + Fixed cost + depreciation	Net farm Income
<ul style="list-style-type: none"> • Revenue = Quantity X Prices <ul style="list-style-type: none"> - Crops - Livestock - Other on-farm activities / products • Direct program payments • Income in kind • Value of inventory change 	<ul style="list-style-type: none"> • Operating expenses: <ul style="list-style-type: none"> - Labor expenses (Cash wages) - Fertilizers expenses - Pesticides expenses - Fuel expenses - Electricity expenses - Costs for feeding animals - Irrigation cost - Taxes - Others (see pag.30-32 of the above link) • Depreciation charges 	<p>$NFI = revenues - cost$</p>

Introduction to question A.8. Question A.8 collects information on external shocks or unforeseen events-- that negatively affected the holding. It is important to solicit more than one coping strategy, if applicable. Filter questions are added in order to avoid unnecessary burden for the respondents.

A.8 Did this holding have access to or availed any of the following mechanisms for protection against external shocks (e.g. drought, floods, pests, market failure, prices and others)?

Reference year: Last calendar year

(Read all options and fill in all that apply)

- ☐ This holding had access to or availed credit (i.e. formal and/or informal) for protection against external shocks
- ☐ This holding had access to or availed insurance for protection against external shocks
- ☐ Neither the holding had access to nor availed any of the above mechanisms for protection against external shocks

This question collects information on mechanisms that allow the holding to protect itself from potential external shocks. Four types of shocks are listed. Enumerators read and explain these shocks given in **Box 17** before continuing.

Box 17: External shocks

1. **Drought:** A prolonged period of abnormally low rainfall, leading to a shortage of water.
2. **Flood:** An overflow of a large amount of water beyond its normal limits, especially over what is normally dry land.
3. **Pest:** A destructive insect or other animal that attacks crops, food, livestock, etc. This can include also heat waves
4. **Market shock:** Any demand or supply side shocks that alter the price matching equilibrium in the market e.g. price reduction for the commodities produced by the holding.

The following codes are associated with question **A.8**:

- 1 This holding had access to or availed credit (i.e. formal and/or informal) for protection against external shocks
- 2 This holding had access to or availed insurance for protection against external shocks
- 3 Neither the holding had access to nor availed any of the above mechanisms for protection against external shocks

Box 18: Shocks coping strategies

1. **Credit:** Credit may have been obtained from a formal/informal sources, such as a banks, relatives or a local money lenders. There has to be an explicit agreement between the lender and the borrower (holding) detailing the terms and conditions of the loan i.e. time of repayment and interest charge on top of the principal amount etc.
2. **Insurance:** Preventive protection measure to protect the holding against external shocks.

Section B: Environmental Dimension of the Holding

Skip B.1 to B.16, if A.1=2. This section collects information on the environmental dimension of the holding and its agricultural area. The aspects covered in this dimension include: prevalence of soil degradation threats, management of pesticides, management of fertilizers, variation in water availability and adoption of biodiversity-supportive practices.

Introduction to question B.1-B.2: These questions are asked in order to collect information on whether the holding has experienced one or more among four listed threats during the past three calendar years. These are: Soil erosion, Reduction of soil fertility, Waterlogging and salinization of irrigated land.

B.1 Have you experienced any of the following soil degradation threats on your holding?

This question is asked with reference to the last three calendar years and ascertain if one or more of the threats listed below were experienced by the holding.

Reference year: Last 3 calendar years

(Fill in all that apply)

- ☐ 1 Soil erosion (loss of topsoil through wind or water erosion)
- ☐ 2 Reduction in soil fertility
- ☐ 3 Waterlogging
- ☐ 4 Salinization of irrigated land
- ☐ 5 Other (specify)
- ☐ 6 None of the above

[→ Go to B.3](#)

Respondents are requested to identify one or more of the above threats. The enumerators must go to question B.3 if the code is 6 “None of the above”.

Box 19. External threats

Soil Erosion: Erosion refers to the wearing away of a field's topsoil by the natural physical forces of water and wind. These can be affected, accelerated or reduced as a function of farming activities such as tillage.

Reduction in soil fertility: Fertility refers to the capacity of a soil to provide crops with essential nutrients without reduction in productivity over the years. Reduction in soil fertility implies a situation in which the capacity of the soil to provide crops with essential plant nutrients tends to reduce from one year to the other.

Waterlogging: Refers to a situation of water stagnation on the land surface or excessive volume of water on the land surface, affecting production.

Salinization of irrigated land: Salt accumulation on the land surface.

B.2 What is the total area of the holding affected by any of the threats identified above?

Reference year: Last 3 calendar years

☐ Total area affected

.....

Area					Unit of measure	
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

Once information on threats have been collected in question B.1, enumerators record the corresponding total agricultural land area affected by one or more of the soil degradation threats.

Note number 1: The enumerators carefully record the total area affected by one or more threats by ensuring that the reported affected area is NOT GREATER than the total agricultural area (check question A.2).

Note number 2: It might be the case that the two soil degradation threats have affected two separate areas of the holding or the same area of the holding may have been affected by two different threats. Enumerators must report the total area affected, irrespective of whether this is the sum of two different areas of land affected by two different threats, or the same area affected by two different threats.

Introduction to question B.3-B.5: These questions gather data to estimate areas under irrigation. The data gathered in this section includes irrigated area, water used and irrigation methods. Skip B3 to B.5 if the farm only carries out livestock activities.

B.3 Did this agricultural holding use water to irrigate crops?

Reference year: Last 3 calendar years

(Fill in one circle only)

- ☐ 1 Yes (indicate the irrigated area or a percentage of the total area of the holding irrigated)
- ☐ 2 No, I don't need irrigation → Go to B.5
- ☐ 3 No, I can't afford irrigation → Go to B.5
- ☐ 4 No, there is no water available → Go to B.5

Area /Percentage

--	--	--	--	--	--

Unit of measure

--	--	--	--	--	--

This question records information on irrigation during the last 3 calendar years. Four answers are possible for this question, with their corresponding codes provided bellows:

- 1** Yes (indicate the irrigated area or percentage of the total area of the holding irrigated)
- 2** No, I don't need irrigation
- 3** No, I can't afford irrigation
- 4** No, there is no water available

If water was used to irrigate crop (code 1), enumerators ask and record the total area, including the unit of measurement (or the percentage of total area) that was irrigated. Enumerators carefully record the total irrigated area by ensuring that the reported irrigated area is not greater than the total agricultural area.

Note: enumerators skip questions B.4 and B.5 if the answer given to question B.3 is 2, 3 or 4.

Box 20: Water for irrigation

Water for irrigation may come from various sources, including rivers, dams or wells and water reservoirs, etc. "Irrigation used on the holding" means that water (other than rain) is applied to crops at least once during the entire reference period (last three calendar years). Those who reported that the holding used water to irrigate their crops must also inform the interviewer about the land area that was irrigated. The land area irrigated corresponds to the one(s) in which one or more crops were cultivated during the past three years, i.e. **the agricultural area irrigated at least once during the reference period**. If the respondent says that crops were irrigated through rain or not irrigated at all, interviews should move to question B.6 (FAO, 2015, para 8.3.2).

B.4 Are you observing any reduction in water availability from well or other sources i.e. lake, canal and river?

Reference year: Last 3 calendar years

(Fill in one circle only)

- ☐ 1 No, water is always available in sufficient quantity when I need it [→ Go to B.6](#)
- ☐ 2 Yes, water level in my well(s) is progressively going down
- ☐ 3 Yes, water in river, lake or canal is getting scarce and I can't have reliable supply when I need it
- ☐ 4 I do not know

This Yes/No question gather information on progressive reduction in water availability from the well or other sources. Codes associated with question B.4 are:

- 1 No, water is always available in sufficient quantity when I need it
- 2 Yes, water level in my well(s) is progressively going down
- 3 Yes, water in river, lake or canal is getting scarce and I can't have reliable supply when I need it
- 4 I do not know

Enumerators go to question **B.6** if the code associated with question B.4 is 1 (No, water is always available in sufficient quantity when I need it).

Box 21: Sources of Irrigation

Water can be sourced using different methods:

1. Well irrigation is a method of irrigation where underground water is tapped through a well (tube well, open well).
2. Water supplied directly by diverting it from the river through canals, or pumping it from a river, lake or groundwater.
3. Water can be applied on the field through canals (gravity), sprinklers or micro-irrigation (drip).

B.5 Are there organizations dealing with water allocation in the area where this holding is located?

Reference year: Last 3 calendar years

(Fill in one circle only)

- ☐ 1 Yes, and they are working well
- ☐ 2 Yes, but they are not working well (specify why)
- ☐ 3 No, there are none
- ☐ 4 No, I don't know

This question collects information on the organizations (both formal and informal) responsible for water allocation in the area where the holding is located. This question also collects information on whether such organization work efficiently. The codes associated with this question are as follows:

- 1 Yes, and they are working well
- 2 Yes, but they are not working well (specify)
- 3 No, there are none
- 4 No, I don't know

Note: enumerators must briefly record why organization are not working well (code2). It is advisable to use key terms while explaining the reason why organizations are not working well.

Box 22: Water allocation

In many countries, water allocation to farms is implemented by organization mandated to ensure the delivery of water to different users according to established rules. These organisations are usually called 'Water users' organizations', 'water boards', 'Water Districts', etc. They can be public, owned by farmers, or private operators.

Introduction to question B.6-B.9. These questions gather information on the use of any synthetic or mineral fertilizer or animal manure/slurry for crops by the holding, its awareness of environmental risks and potential measures adopted to mitigate the risks associated with the use of synthetic and mineral fertilizers

B.6 Did this agricultural holding use any synthetic or mineral fertilizer or animal manure/slurry for crops?

Reference year: Last calendar year

(Fill in one circle only)

- ☐ 1 Yes
☐ 2 No

[→ Go to B.10](#)

This Yes/No question records information on the use of synthetic or mineral fertilizers during the past calendar year. A definition of synthetic /mineral fertilizers is given in Box 23. While Box 24 provides an explanation of environmental risks associated with the use of synthetic /mineral fertilizers for crops.

Note: if the answer is “no” (code 2) enumerators must go to question B.10.

Box 23: Synthetic or mineral fertilizers

The most commonly used **synthetic or mineral fertilizers** for agricultural production are:

1. NITROGEN FERTILIZERS

- Sodium nitrate
- Ammonium sulphate
- Ammonium nitrate
- Urea
- Ammonium phosphate, dibasic
- Ammonium phosphate, monobasic

2. POTASSIUM (POTASH) FERTILIZERS

- Potassium chloride (murate of potash)
- Potassium nitrate.
- Potassium sulphate.

3. PHOSPHATE FERTILIZERS

- Di-calcium phosphate, anhydrous
- Bone meal
- Rock phosphate (fluorapatite)
- Single superphosphate
- Triple superphosphate

4. CALCAREOUS

- Calcium carbonate (limestone)
- Calcium oxide (quicklime)

Country customization of the list of synthetic and mineral fertilizers is highly advisable in this question. Note that the survey does not request that the farmers indicate which fertilizer they use.

Animal manure/slurry for crops

5. **Manure** is animal faeces rich in nutrients, sometimes mixed with chemicals that is spread on the ground as fertiliser.
6. **Slurry** is created from cow manure and water and provides a natural fertiliser that farmers can use to encourage the growth of grass and other crops. **Slurry** is usually stored in a tank or lagoon before it is applied to farmland as fertiliser.

Box 24: Environmental risks associated with excessive use of synthetic and mineral fertilizers

Depletes the Quality of the Soil

Using too much of fertilizers in the soil can alter the fertility of the soil by increasing the acid levels in the soil.

Pollution of Water bodies

Using too much of fertilizers in the soil leads to eutrophication. Fertilizers contain substances like nitrates and phosphates that are flooded into lakes and oceans through rains and sewage. These substances prove to become toxic for the aquatic life, thereby, increasing the excessive growth of algae in the water bodies and decreasing the levels of oxygen. This leads to a toxic environment and leads to death of fish and other aquatic fauna and flora. Indirectly, it contributes to an imbalance in the food chain as the different kinds of fishes in the water bodies tend to be the main food source of various birds and animals in the environment.

Climate change

Fertilizers consists of substances and chemicals like methane, carbon dioxide, ammonia, and nitrogen, the emission of which contribute to a great extent in the quantity of greenhouse gases present in the environment. This in turn leads to global warming and weather changes. In fact, nitrous oxide, which is a by-product of nitrogen, is the third most significant greenhouse gas, after carbon dioxide and methane.

B.7 Are you aware of the environmental risks associated with the excessive use or misuse use of fertilizer?

Reference year: Last calendar year

(Fill in one circle only)

- ☐ 1 Yes
☐ 2 No

This Yes/No question collect information on holder's awareness of environmental risks associated with the use of synthetic and mineral fertilizers.

B.8 Did this agricultural holding take specific measures to mitigate the environmental risks associated with the use of synthetic and mineral fertilizers?

Reference year: Last calendar year

(Fill in one circle only)

- ☐ 1 Yes
☐ 2 No

[→ Go to B.10](#)

This Yes/No question collect information on specific measures taken by the holdings to mitigate environmental risks associated with the use of synthetic and/or mineral fertilizers. Enumerators go to question B.10 if answer to B.8 is 2 (No)

B.9 If so, which specific measures did the agricultural holding take or adopt?

Reference year: Last calendar year

(Read all options and fill in all that apply)

- ☐ 1 Follow protocols as per extension service or retail outlet directions or local regulations, not exceeding recommended doses
- ☐ 2 Use organic source of nutrients (including manure or composting residues) alone, or in combination with synthetic or mineral fertilizers
- ☐ 3 Use legumes as a cover crop, or component of a multi/crop or pasture system to reduce fertilizer inputs
- ☐ 4 Distribute synthetic or mineral fertilizer application over the growing period
- ☐ 5 Consider soil type and climate in deciding fertilizer application doses and frequencies
- ☐ 6 Use soil sampling at least every 5 years to perform nutrient budget calculations
- ☐ 7 Perform site-specific nutrient management or precision farming
- ☐ 8 Use buffer strips along water courses.

The following codes are associated with the list of measures to mitigate environmental risks. Box 25 explains the key terms explaining each of the below listed specific measures.

1	Follow protocols as per extension service or retail outlet directions or local regulations, not exceeding recommended doses
2	Use organic source of nutrients (including manure or composting residues) alone, or in combination with synthetic or mineral fertilizers
3	Use legumes as a cover crop, or component of a multi/crop or pasture system to reduce fertilizer inputs
4	Distribute synthetic or mineral fertilizer application over the growing period
5	Consider soil type and climate in deciding fertilizer application doses and frequencies
6	Use soil sampling at least every 5 years to perform nutrient budget calculations
7	Perform site-specific nutrient management or precision farming
8	Use buffer strips along water courses

It is important to note that more than one specific measure (taken to mitigate environmental risks associated with the use synthetic and mineral fertilizers) can be specified.

Note: enumerators must briefly explain what are the measures taken or adopted. It is advisable to use key terms while explaining other measure taken or adopted to mitigate environmental risks associated with the use of synthetic or mineral fertilizers.

Box 25: Key terms

Follow protocols as per extension service or retail outlet recommendations or local regulations: These are country- or region-specific protocols released by official bodies or retailers and that provide information on doses to apply and application modalities.

Organic sources of nutrients: Nutrient sources are generally classified as organic, mineral or synthetic. Organic nutrient sources are manures, bulky organic manures or organic fertilizers. Most organic nutrient sources, including waste materials, have widely varying composition and often only a low concentration of nutrients, which differ in their availability

Legumes as a cover crop: Legumes capture nitrogen from the air and store it in the root zone, thus contributing to nitrogen fertilisation. Commonly used legumes include:

- Winter annuals, such as crimson clover, hairy vetch, field peas, subterranean clover and many others
- Perennials like red clover, white clover and some medics
- Biennials such as sweet clover

Site-specific nutrient management (SSNM): a technology that provides guidance to farmers on the distribution of nutrient requirements across plots. SSNM provides savings for farmers through more efficient fertilizer use.

Soil Sampling: It involves measuring soil properties correctly through standard laboratory techniques and precise sampling methods. Soil test are used to assess fertility and is analysis of a soil sample to determine nutrient content, composition, and other characteristics such as the acidity or pH level.

Buffer strips: A buffer strip is an area of land maintained in permanent vegetation that helps to control soil and water quality and has other environmental benefits

(www.deepartnership.org/userfiles/file/guidance_and_information/Buffer-Strip-Guidance-FINAL.PDF)

Introduction to question B.10-B.16. Question from B.10 to B.16 data on those holdings that, during the past agricultural season have applied pesticides on their agricultural production, as well as on the awareness of the potential risks associated with the use of pesticides and specific measures to mitigate the environmental and health risks associated with the use of pesticides.

B.10 Did this agricultural holding use any pesticides for crop or livestock production?

Reference year: Last calendar year

(Fill in one circle only)

- ☐ 1 Yes
☐ 2 No

[→ Go to B.17](#)

This Yes/No question collect information on whether (or not) agricultural holdings used pesticides for their crop or livestock production. **Note: if the answer given is “no” (code 2) enumerators go to question B.17 and skip questions from B.11 to B.16.**

B.11 What type of pesticides did this agricultural holding used?

Reference year: Last calendar year

(Fill in one circle only)

- ☐ 1 Moderately or slightly hazardous
☐ 2 Highly, extremely hazardous or illegal pesticides

This question collects information on whether agricultural holding used highly/extremely hazardous pesticides/ illegal pesticides or moderately/slightly hazardous pesticides for their crop production.

A definition of highly hazardous and moderately hazardous pesticides is given in Box 26.

Box 26: Definition of pesticides and highly hazardous pesticides

Pesticides products are substances applied to prevent, destroy or control a harmful organism (a “pest”) or disease, or protect plants or plant products during production, storage and transport or protect crops.

They contain at least one active substance and have one of the following functions:

- Protect plants or plant products against pests/diseases, before or after harvest
- Influence the life processes of plants (such as substances influencing their growth, excluding nutrients)
- Preserve plant products
- Destroy or prevent growth of undesired plants or parts of plants

The meaning of pesticide must clearly be explained by interviewers to respondents and an ideal list of pesticides by brand type used in the country should be read out in order for the respondent to clearly understand what a pesticide product is.

According to FAO (<http://www.fao.org/agriculture/crops/thematic-sitemap/theme/pests/code/hhp/en/>) a considerable proportion of the pesticides still being used in the world can be considered highly hazardous, because they have a high acute toxicity, have known chronic toxic effects even at very low exposure levels, or are very persistent in the environment or in organisms, for example. In particular, in developing countries, Highly Hazardous Pesticides (HHPs) may pose significant risks to human health or the environment, because risk reduction measures such as the use of personal protective equipment or maintenance and calibration of pesticide application equipment are not easily implemented or are not effective.

Highly hazardous pesticides are classified according to the World Health Organization Recommended Classification of Pesticides by Hazard (http://www.who.int/ipcs/publications/pesticides_hazard_2009.pdf), as having one or more of the following characteristics:

- Pesticide formulations that meet the criteria of classes IA or IB of the WHO Recommended Classification of Pesticides by Hazard; or
- Pesticide active ingredients and their formulations that meet the criteria of carcinogenicity Categories 1A and 1B of the Globally Harmonized System on Classification and Labelling of Chemicals (GHS); or
- Pesticide active ingredients and their formulations that meet the criteria of mutagenicity Categories 1A and 1B of the Globally Harmonized System on Classification and Labelling of Chemicals (GHS); or
- Pesticide active ingredients and their formulations that meet the criteria of reproductive toxicity Categories 1A and 1B of the Globally Harmonized System on Classification and Labelling of Chemicals (GHS); or
- Pesticide active ingredients and formulations listed by the Rotterdam Convention in its Annex III; or
- Pesticides listed under the Montreal Protocol; or
- Pesticide active ingredients and formulations that have shown a high incidence of severe or irreversible adverse effects on human health or the environment.

Illegal pesticides are those pesticides that have been banned in most countries worldwide because of their persistence in the environment and human toxicity. The list of illegal pesticides is generally made available by national authorities.

B.12 Are you aware of the environmental and health risks associated with the use of pesticides?

Reference year: Last calendar year

(Fill in one circle only)

- ☐ 1 Yes
☐ 2 No

This Yes/No question collect information on holder's awareness of potential environmental and health related-risks associated with the use of pesticides.

B.13 Did this agricultural holding take specific measures to protect people from health-related risks?

Reference year: Last calendar year

(Fill in one circle only)

- ☐ 1 Yes
☐ 2 No

[→ Go to B.15](#)

This YES/No question collect information on whether specific measures were taken by the holding to mitigate health-related risks associated with the use of pesticides.

Note: if the answer given is "no" (code 2) enumerators go to question B.15.

B.14 Which of the following measures did this agricultural holding adopt to protect people from health-related risks?

Reference year: Last calendar year

(Read all options and fill in all that apply)

- ☐ 1 Adherence to label directions for pesticide use (including use of protection equipment)
☐ 2 Maintenance and cleansing of protection equipment after use
☐ 3 Safe disposal of waste (cartons, bottles and bags)

A detailed list of specific measures to protect people from health-related risks is specified in question B.14. Each of the below specified measures is defined in box 27 to facilitate the respondent's comprehension of question B.14. Codes associated with potential measures taken are as follows:

- 1 Adherence to label directions for pesticide use (including use of protection equipment)
2 Maintenance and cleansing of protection equipment after use
3 Safe disposal of waste (cartons, bottles and bags)

Note: enumerators must briefly explain what are the measures adopted. It is advisable to use key terms while explaining other measure adopted to protect people from health-related risks associated with the use of pesticides.

Box 27: Definitions of key terms

All pesticides are toxic to some or all living organisms. They are designed to prevent, destroy or control specific plants or animals that threaten crops or other useful resources. However, if beneficial insects or crops are exposed to pesticides they too may be destroyed, and farm animals, wildlife or people may become ill or die after exposure to even very small quantities of pesticide. The following measures allow preventing people from health-related risks.

Adherence to label directions for pesticide use: In many countries, pesticide labels are legal documents in that they are required by law to be put on a pesticide package. Generally, also the (minimum) content and format of the label is defined by law. In such cases, all pesticide labels, and any modifications or variations, need to be approved by the responsible authority. As a result, pesticide labels are enforceable, and it will be a violation to use a pesticide product in a manner inconsistent with its labelling. Adherence to label recommendations implies that the agricultural holding follows the regulations mandated by the national authority while using pesticides (see also <http://www.fao.org/3/a-i4854e.pdf>)

Use of personal protection equipment: the following equipment items are recommended to be used while applying pesticides:

- Protective eyewear – Use of safety glasses with brow, front, and temple protection; or a face shield; or fully-enclosed goggles; or a full-face respirator.
- Goggles – Use of a fully-enclosed, chemical-splash resistant goggles or a full-face respirator.
- Full-Face Respirator – use a tight-fitting, full-face respirator.
- Chemical-resistant coveralls – A one- or two-piece suit that the manufacturer specifies to be resistant to certain chemicals.

Safe disposal of waste (cartons, bottles and bags): pesticide containers must take into account all the specific requirements related to the safe handling of pesticides. Containers should allow safe storage, transport, preparation and use of the product, as well as rinsing and disposal of the empty container

B.15 Did this agricultural holding adopt specific measures to avoid environment-related risks?

Reference year: Last calendar year

(Fill in one circle only)

- ☐ 1 Yes
☐ 2 No

→ Go to B.17

This Yes/No question collect information on whether specific measures were taken by the holding to avoid environment-related risks associated with the use of pesticides.

Note: if the answer given is “no” (code 2) enumerators go to question B.17.

B.16 Which of the following measures did this agricultural holding adopt in relation to pest control? (plant pest and animal diseases)

Reference year: Last calendar year

(Read all options and fill in all that apply)

- ☐ 1 Adherence to label directions for pesticide application
- ☐ 2 Adjustment of planting time
- ☐ 3 Application of crop spacing
- ☐ 4 Application of crop rotation
- ☐ 5 Application of mixed cropping
- ☐ 6 Application of inter-cropping
- ☐ 7 Perform biological pest control
- ☐ 8 Use of biopesticides
- ☐ 9 Adopting pasture rotation to suppress livestock pest population
- ☐ 10 Systematic removal of plant parts attacked by pests
- ☐ 11 Maintenance and cleansing of spray equipment after use
- ☐ 12 Use one pesticide no more than two times or in mixture in a season to avoid pesticide resistance.

A detailed list of specific measures adopted by the holding to avoid environment-related risks is further specified in this question and defined in Box 28 to facilitate the respondent's comprehension. Codes associated with potential measures adopted are as follows

- 1 Adherence to label directions for pesticide application
- 2 Adjustment of planting time
- 3 Application of crop spacing
- 4 Application of crop rotation
- 5 Application of mixed cropping
- 6 Application of inter-cropping
- 7 Perform biological pest control
- 8 Use of biopesticides
- 9 Adopting pasture rotation to suppress livestock pest population
- 10 Systematic removal of plant parts attacked by pests
- 11 Maintenance and cleansing of spray equipment after use
- 12 Use one pesticide no more than two times or in mixture in a season to avoid pesticide resistance

Note: Enumerators must briefly explain what measure are adopted. It is advisable to use key terms while explaining other measure adopted to avoid environment-related risks associated with the use of pesticides.

Box 28: Definitions of key terms

Planting time: The period of the year that is warm enough for plants to grow. **Adjusting the planting time implies** that a farmer adjusts the period for time to grow in accordance with awareness of a pest's life cycle, which stages are most likely to cause economic damage, and when best to monitor is essential when planning a pest management program. Pest life cycle diagrams indicate when the various pests stages are likely to be found in the crop, management considerations, and critical monitoring periods (available at <https://ipmguidelinesforgrains.com.au/ipm-information/making-informed-control-decisions/pest-life-cycles/>).

Perform biological control: Aims to reduce plant pathogens and limit pests such as insects, parasitic nematodes and weeds. In its narrowest sense, biocontrol suppresses pest organisms by using other organisms.

Crop rotation, mixed cropping or inter-cropping for breaking the pest cycle: mixed cropping and crop rotation embrace one of the principles of conservation agriculture. Planting of the same crop each season - as sometimes practiced in conventional farming is minimized by planting the right mix of crops in the same field, and rotating crops from season to season. This allows a breakdown of survival and multiplication cycles of pests, diseases and weeds resulting in higher yields and maintenance of soil fertility.

Preservation of natural biological control services: is a method of controlling pests such as insects, mites, weeds and plant diseases using other organisms. It relies on predation, parasitism, herbivory, or other natural mechanisms, but typically also involves an active human management role. It can be an important component of integrated pest management (IPM) programs.

Adherence to label directions for pesticide use: in many countries, pesticide labels are legal documents in that they are required by law to be put on a pesticide package. Generally, also the (minimum) content and format of the label is defined by law. In such cases, all pesticide labels, and any modifications or variations, need to be approved by the responsible authority. As a result, pesticide labels are enforceable, and it will be a violation to use a pesticide product in a manner inconsistent with its labelling. Adherence to label recommendations implies that the agricultural holding follows the regulations mandated by the national authority while using pesticides (see also <http://www.fao.org/3/a-i4854e.pdf>).

Introduction to question B.17-B.20. These questions gather data on the level of adoption of biodiversity-supportive practices by the holding at ecosystem, species and genetic levels.

B.17 Is this agricultural holding covered by natural or diverse vegetation including one or a combination of the following?

Reference year: Last calendar year

(Fill in all that apply, leave it blank if "None of the above")

- ☐ 1 Natural pasture or grasslands
- ☐ 2 Wildflower strips
- ☐ 3 Stone or wood heaps
- ☐ 4 Trees or hedgerows
- ☐ 5 Natural ponds or wetlands
- ☐ 6 None of the above

→ Go to B.19

This question is asked with reference to the last calendar year. Enumerators must list all options related to natural and diverse vegetation as reported below from code 1 to code 5. Once one or more of the natural or diverse vegetation options are filled in questions B.17, enumerators record the area of the holding which is not cultivated as it is covered by one or a combination of the above listed natural or diverse vegetation options in question B.17.

Note: if the answer given is coded 6 (none of the above) enumerators go to question B.19 and skip next question B.18

Box 29: Definitions of key terms

Natural pasture or grasslands (<http://www.fao.org/docrep/005/x7660e/x7660e0b.htm>): Natural pasture takes many forms, all of which have in common only that the herbage has not been sown. Most is grazed, but some is used for hay, which is made on sites as different as meadows, almost sheer clearings on hillsides, subtropical forest land closed for regeneration, alpine grassland, steppes, or a host of other uncultivated lands. In its narrow sense, “grassland” can be defined as ground covered by vegetation dominated by grasses, with little or no tree cover.

Wildflower strips: Can be defined as flower strips of a wild or uncultivated plant or the plant bearing it. They are known to attract and conserve a large diversity of insects, as they provide them food resources such as pollen and nectar, as well as shelter and overwintering sites.

B.18 What is the total area of the holding covered by any of the natural or diverse vegetation identified above? (Please cross check with II.2)

Reference year: Last calendar year

☐ Total area covered

.....

Area					Unit of measure	

This question is asked with reference to the last calendar year. Enumerators record the area of the holding which is not cultivated because it is covered by natural or diverse vegetation identified in question B.17.

It is important to the total area of the holding covered by natural or diverse vegetation MUST not be greater than the total area of the holding. Yet, this question must be filled if and only if it is reported the area of the holding whose land use type is “other” (code 10 in question II.2).

B.19 Are you using medically important antimicrobials as growth promoter for your livestock?

Reference year: Last calendar year

(Fill in one circle only)

- ☐ 1 Yes
☐ 2 No
☐ 3 I don't know

This Yes/No question collect information on the use of antimicrobials as growth promoter for livestock. The definition of antimicrobials is reported in the box below. Enumerators do not ask this question if the agricultural holding does not have any animal (farm carries out only crop activities).

Box 30: Definition of key terms

Antimicrobials: The term “antibiotic growth promoter” is used to describe any medicine that destroys or inhibits bacteria and is administered at a low, sub therapeutic dose. The use of antibiotics for growth promotion has arisen with the intensification of livestock farming. Antimicrobials are products that kill microorganisms or keep them from multiplying (reproducing) or growing (<https://animalantibiotics.org/dig-deeper/industry-glossary/>). According to the National Office of Animal Health (NOAH, 2001), antibiotic growth promoters are used to “help growing animals digest their food more efficiently, get maximum benefit from it and allow them to develop into strong and healthy individuals”. Although the mechanism underpinning their action is unclear, it is believed that the antibiotics suppress sensitive populations of bacteria in the intestines (<http://www.fao.org/tempref/docrep/fao/007/y5159e/y5159e05.pdf>).

The use of antibiotics has become common in the livestock production around the world. The growth-promoting effects of antibiotics are undisputed, but the collateral and long-term effect are debatable.

B.20 What is the percentage of the agricultural area on which crop rotation or crop/pasture rotation involving at least two different crops/pastures of two different plant genus is practiced?

Reference year: Last three calendar years

(Leave it blank if not practiced)

☐ 1 Percentage of agricultural area

Percentage Area				

This question is asked with reference to the last three calendar years and it records the percentage of agricultural area of the holding in which crop rotation and/or pasture rotation is practiced for at least two different crops/pastures of two different plant families is practiced.

It is important that enumerators only record the percentage of agricultural area in which at least two crops are rotating on the same land. A definition of crop rotation is given in the box below.

Box 31: Definition of key terms

Crop rotation: The practice of growing different crops in succession over a given time span on the same land, predominantly to preserve the productive capacity of the soil. Crop rotation implies simply dividing the growing space into a number of distinct areas, identify the crops to grow and then keep plants of the same type together in one area. Every year the plants grown in each given area are changed, so that each group (with its own requirements, habits, pests and diseases) can have the advantage of new ground.

Introduction to question B.21-B.22. Questions from **B.21** and **B.22** collect information on organic farming practices, i.e. it ascertains whether the farm is producing agricultural products which have been produced, in accordance with specific technical specifications (standards) and have been certified as “organic” by a certification body.

B.21 Did the holding produce crops and/or livestock that are certified organic or undergoing the organic certification process during the reference period?

- ☐ 1 No
☐ 2 Yes

→ Go to C.1

This yes/no question is asked with reference to the last calendar year and it aims at ascertaining whether the holding produced certified crop or livestock or its undergoing certification process. A definition of certified organic crops and livestock is provided in box 32. Codes are 1 for yes and 2 for no.

Box 32: How can certified organic crop/livestock be defined?

According to the AGRIS manual (FAO, 2017, p.112) the definition of certified organic crops must be established at country level, following local regulations and practices.

In general, certified organic farming practices means that the farm is producing agricultural products which have been produced, stored, processed, handled and marketed in accordance with specific technical specifications (standards) and have been certified as “organic” by a certification body. Some bodies allow certification of a part of a farm as long as organic and non-organic products are not mixed, while others require whole-farm certification. Certification can be given through a third-party accredited certification body or authority, or through Participatory Guarantee Systems (PGSs). Third-party certification bodies are accredited to a particular market (that is, the certification ensures that the production systems meet the regulations applying to a particular market) and certification by a certification body enables producers to export products labelled as organic to that market (being certified does not allow access to all markets). A PGS is based on the active participation of stakeholders and only recognized within a single country. It thus provides certification of organic production only for local markets, and not for export (FAO, 2015, para. 8.6.16).

An FAO webpage on certified organic crop can be browsed at <http://www.fao.org/organicag/oa-faq/oa-faq2/en/>

B.22 Answer the following questions about the holding's organic certification.

- ☐ Report the holding's Organic Registration Number
☐ Report the name of the certifying body

1. Report the holding's Organic registration number
2. Report the name of the certifying body

Data collectors record the holding's Organic Registration Number and the certification body that has certified organic farming practices adopted by the holding. Skip this question if **B.21 was 1**.

Section C: Social dimension of the holding

This section collects information on the social dimensions of the holding. The data items collected in this section covers; decent work, food security and secure rights to land tenure.

Introduction to question C.1-C.2. Questions from C.1 to C.2 gather information about unskilled hired labor used on agricultural holdings.

C.1 Did this agricultural holding hire any workers for carrying out simple and routine tasks?

Reference year: Last calendar year

(Fill in one circle only)

- ☐ 1 Yes
☐ 2 No

→ Go to C.3

This Yes/No question collect information on the employed unskilled workers. An explanation of unskilled workers is given in Box 33 below.

Note: if the answer given is “no” (code 2) enumerators go to question C.3.

If the respondent uses vague terms in defining unskilled workers, ask him/her the exact type of job he/she did most of the time.

Box 33: Defining unskilled occupations

Occupation refers to the kind of work that a person does or the kind of the work he/she did, when he/she was working for the first time. This question is to enquire specifically about the nature of the job he/she is doing most of the time in the last agricultural year. The elementary occupation group is defined by the International Standard Classification of Occupation ('08) of the International Labor Organization. Workers employed by the holding under this occupation group are unskilled laborers that perform basic task for the holding. Interviewers should try to be as comprehensive as possible and they should avoid using the terminology as per ISCO classification, which is “elementary occupation/unskilled workers”. More specifically, interviewer should not ask whether the agricultural holding hired any unskilled workers. Rather, they should ask if any workers performing simple and routine farming tasks, requiring the use of simple hand-held tools and very often considerable physical effort, were employed in the past 12 months prior to the date of the interview. Tasks performed by laborers in this sub-major group usually include: digging, shovelling, loading, unloading, stacking, raking, pitching; spreading manure or fertilizers; watering and weeding; picking fruit, vegetables and various plants; feeding animals; cleaning animal quarters and farm ground. Agricultural holding that hired unskilled workers must also report the number of workers who were hired during the last agricultural season.

C.2 How much did this agricultural holding pay on average in cash and/or in-kind to a worker performing simple and routine tasks per day (of 8 hours)?

Reference year: Last calendar year

(Read all options and fill in all that apply)

- ☐ 1 Daily average wage in local currency units
☐ 2 Daily average wage paid in-kind and converted in local currency units

Daily average wage

This question collects information on the **average daily** payment (wages/salary) paid to unskilled workers. Enumerators should also record information about allowances and gratuities, which include allowances and per diems paid to employees. In case the time unit for payment is not the day, enumerators must ask the respondent to estimate the amount of wage paid on a daily basis. For instance, if payment is weekly, monthly,

annual, etc., respondent must convert the corresponding amount into a daily measure, by providing an estimate of wage paid to a given unskilled worker.

NOTE: Payment can also be provided in-kind which must be converted into a monetary value. In estimating in-kind payments, the respondent should estimate what he or she would have to paid for the labor if products through which the payment was made (in-kind) were purchased in the market.

Introduction to question C.3-C.10. The set of eight Yes/No questions collect information about the level of food security in the household. The questions on food security should be asked to the holder and his/her household members. In case the respondent of the survey is a manager of the holding or an employee, then this section should not be asked as it is unlikely that they will be informed about the situation of food security of the holder and his/her household members.

It is important to notice that the reference period for questions C.3-C.10 is not the last calendar year but the last 12 months prior to the date of the interview. This implies that if the interview is conducted on September 1 2018, the last 12 months will be from September 1, 2017 to August 31, 2018.

Before asking question from C3 to C.10 make sure to only ask them to household farms. Enumerators skip questions from C.3 to C.10 and go to question C.11 if the sampled holding belongs to the Non-household sector. Yet, do not ask this question to respondent's managers or employees (code 3 and 5 in question I.1.4)

C.3. During the last 12 months, was there a time when you (or any other member in the household) were worried that you would not have enough food to eat because of a lack of money or other resources?

Reference year: Last 12 months

(Fill in one circle only)

- ☐ 1 Yes
- ☐ 2 No
- ☐ 3 I don't know
- ☐ 4 I don't want to answer

This Yes/No question refers to a state of being worried, anxious, apprehensive, afraid or concerned that there might not be enough food or that food will run out (because there is not enough money or other resources to get food). The worry or anxiety is due to circumstances affecting their ability to procure food, such as: loss of employment or other source of income, or other reasons for not having enough money; insufficient food production for own consumption; insufficient food available for hunting and gathering; disrupted social relationships; loss of customary benefits or food assistance; environmental or political crises. It is not necessary for the respondent to have actually experienced not having enough food or running out of food to answer yes to this question.

C.4. Still thinking about the last 12 months, was there a time when you (or any other household in the household) were unable to eat healthy and nutritious food because of a lack of money or other resources?

Reference year: Last 12 months

(Fill in one circle only)

- ☐ 1 Yes
- ☐ 2 No
- ☐ 3 I don't know
- ☐ 4 I don't want to answer

This Yes/No question asks the respondent whether s/he was not able to get foods they considered healthy or good for them, foods that make them healthy, or those that make a nutritious or balanced diet (because there was not enough money or other resources to get food).

The answer depends on the respondent's own opinion of what they consider to be healthy and nutritious foods. This question refers to the quality of the diet and not the quantity of foods eaten.

C.5. Was there a time when you (or any other member in the household) ate only a few kinds of foods because of a lack of money or other resources?

Reference year: Last 12 months

(Fill in one circle only)

- ☐ 1 Yes
- ☐ 2 No
- ☐ 3 I don't know
- ☐ 4 I don't want to answer

The Yes/No question asks if the respondent was forced to eat a limited variety of foods, the same foods, or just a few kinds of foods every day because there was not enough money or other resources to get food. The implication is that the diversity of foods consumed would likely increase if the household had better access to food.

Alternative phrases:

- You ate meals with a limited variety of foods;
- You ate the same foods or just a few kinds of foods every day;
- You had to eat a limited variety of foods;
- You had to eat the same foods every day;
- You had to eat just a few kinds of foods.

This question refers to quality of the diet and not the quantity of foods eaten. It implies lack of money/resources rather than customary habits or other circumstances (i.e., health or religion) as the reason for limiting the variety of food.

C.6. Was there a time when you (or any other member in the household) had to skip a meal because there was not enough money or other resources to get food?

Reference year: Last 12 months

(Fill in one circle only)

- ☐ 1 Yes
- ☐ 2 No
- ☐ 3 I don't know
- ☐ 4 I don't want to answer

This Yes/No question inquiries about the experience of having to miss or skip a major meal (for example, breakfast, lunch or dinner depending on the norm for number and times of meals in the culture) that would normally have been eaten (because there was not enough money or other resources to get food.) This question refers to insufficient quantity of food.

C.7. Still thinking about the last 12 months, was there a time when you (or any other member in the household) ate less than you thought you should because of a lack of money or other resources?

Reference year: Last 12 months

(Fill in one circle only)

- ☐ 1 Yes
- ☐ 2 No
- ☐ 3 I don't know
- ☐ 4 I don't want to answer

This Yes/No question inquiries about eating less than what the respondent considered they should, even if they did not skip a meal (because the household did not have money or other resources to get food). The answer depends on the respondent's own opinion of how much they think they should be eating. This question refers to quantity of foods eaten and not the quality of the diet. This question does not refer to special diets to lose weight or for health or religious.

C.8. Was there a time when you (or any of the other member in the household) ran out of food because of a lack of money or other resources?

Reference year: Last 12 months

(Fill in one circle only)

- ☐ 1 Yes
- ☐ 2 No
- ☐ 3 I don't know
- ☐ 4 I don't want to answer

This yes/no question refers to any experiences when there was actually no food in the household because they did not have money, other resources, or any other means to get food.

C.9. Was there a time when you (or any of the other member in the household) were hungry but did not eat because there was not enough money or other resources for food?

Reference year: Last 12 months

(Fill in one circle only)

- ☐ 1 Yes
- ☐ 2 No
- ☐ 3 I don't know
- ☐ 4 I don't want to answer

This Yes/No question asks about the physical experience of feeling hungry, and specifically, feeling hungry and not being able to eat enough (because of a lack of money or resources to get enough food). It does not refer to special diets to lose weight or fasting for health or religious reasons.

C.10. During the last 12 months, was there a time when the you (or any of the member in the household) went without eating for a whole day because of a lack of money or other resources?

Reference year: Last 12 months

(Fill in one circle only)

- ☐ 1 Yes
☐ 2 No
☐ 3 I don't know
☐ 4 I don't want to answer

This Yes/No question asks about a specific behaviour—not eating anything all day (because of a lack of money and other resources to get food). It does not refer to special diets to lose weight or fasting for health or religious reasons. Codes associated with this question are as follows:

1. Yes
2. No

Box 34: Food Insecurity Experience Scale

The items that compose the FIES module, ask people directly about having to compromise the quality and quantity of the food they eat due to limited money or other resources to obtain food. Each item refers to a different situation and is associated with a level of severity according to the theoretical construct of food insecurity underlying the scale. By asking the series of related questions that compose the FIES, it is possible to classify respondents at different levels of severity: “food secure” (those who answer “no” to all the questions about food insecurity-related experiences) or “food insecure” along a continuum of food insecurity severity, as shown below (see: Ballard, TJ, Kepple, AW, Cafiero, C. FAO, 2013).

From Mild food insecurity			... To Severe food insecurity
Worrying about how to produce food	Compromising on quality and variety	Reducing quantities, skipping meals	Experiencing hunger

Introduction to question C.11-C.14. These questions collect information on how much land is owned by the holding and how it was obtained. These set of questions is crucial but sensitive, so interviewers should ask them carefully. It is sensitive because the head of the holding may think that the government has plans to confiscate his/her land or, alternatively, to compensate the holding they have only a small plot.

C.11. Does the holder/holding have a formal document for any of the agricultural land that it holds (alternatively ‘possess, use, and occupy’) issued by the Land registry/Cadastral agency?

Reference year: Last calendar year

(Fill in one circle only)

- ☐ 1 Yes
☐ 2 No
☐ 3 Don't know
☐ 4 Refuses to respond

This question identifies whether there is a legally recognized document for any of the agricultural land that the respondent has declared to have, as well as the type of documentation held by the respondent for the land owned. Documented ownership / tenure rights refer to the existence of any document an individual can use to claim ownership or tenure rights in law over the land.

Below is the list of formal documents issued by the Land registry/ Cadastral agency:

- 1 Title deed
- 2 Certificate of customary tenure
- 3 Certificate of occupancy
Registered will or registered certificate of hereditary
- 4 acquisitions
- 5 Registered certificate of perpetual / long term lease
- 6 Registered rental contract

C.12 Is the name of the holder or any other member of the holding is listed as an owner or use right holder on any of the legally recognized documents?

Reference year: Last calendar year

(Fill in one circle only)

- ☐ 1 Yes
- ☐ 2 No
- ☐ 3 Don't know
- ☐ 4 Refuses to respond

Because individual names can be listed as witnesses on a document, it is important to ask if the respondent is listed "as an owner" or "holder" on the document. It is recommended that the measure of documented ownership / tenure rights not be conditional on the respondent producing the document for the enumerator to confirm.

C.13. Does the holder/holding have the rights to sell any of the parcel of the holding (alternatively 'parcel possessed, used or occupied')?

Reference year: Last calendar year

(Fill in one circle only)

- ☐ 1 Yes
- ☐ 2 No
- ☐ 3 Don't know
- ☐ 4 Refuses to respond

This question records information on whether the respondent believes that he/she has the right to sell any of the agricultural land s/he reports possessing. When a respondent has the right to sell the land, it means that he or she has the right to permanently transfer the land to another person or entity for cash or in kind benefits.

C.14. Does the holder/holding have the rights to bequeath any of the parcel of the holding (alternatively 'parcel possessed, used or occupied')?

Reference year: Last calendar year

(Fill in one circle only)

- ☐ 1 Yes
- ☐ 2 No
- ☐ 3 Don't know
- ☐ 4 Refuses to respond

This question obtains information on whether the respondent believes that he/she has the right to bequeath any of the agricultural land he/she reports possessing. When a respondent has the right to bequeath the land, it means that he/she has the right to give the land by oral or written will to another person(s) upon the death of the respondent.

END OF SURVEY

The enumerator thanks the respondent and record the end time of the survey.

End time of the survey: hour minutes

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**Food and Agriculture
Organization of the
United Nations**

SDG Indicator 2.4.1

PROPORTION OF AGRICULTURAL AREA UNDER PRODUCTIVE AND SUSTAINABLE AGRICULTURE

METHODOLOGICAL NOTE

Revision 10

22 July 2020

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1. Introduction:

Background on SDG indicators

In September 2015, the United Nations General Assembly adopted the 2030 Development Agenda and an associated 17 Sustainable Development Goals (SDGs). The resultant SDGs are accompanied by 169 targets under the various goals and a set of 232 indicators to monitor progress toward the SDGs. Responsibility for the development of indicators is given to the United Nations Statistical Commission (UNSC), which established an Inter-Agency and Expert Group on Sustainable Development Goals indicators (IAEG-SDG) comprising of 28 member countries.

While the international system of official statistics is embodied in the UNSC and member countries, in practice the measurement and international reporting of the comprehensive set of SDG topics is coordinated through a range of international agencies. These agencies, including the OECD, WHO, FAO, IMF, World Bank, ILO, have developed statistical and measurement expertise in the particular areas that fall within their broader roles. Under the auspices of the IAEG-SDG, various agencies were given “custodianship” for the finalization of the appropriate indicators for the different SDG targets and for the co-ordination of data collection following endorsement of the indicators, including leading the co-ordination with other international agencies. FAO was given custodianship of 21 indicators across six SDGs.

Among the large number of SDG indicators, some are based on currently established methods and data (Tier I); others have methods but data collection is more limited (Tier II); and finally there are indicators for which agreed definitions and methods need to be developed (Tier III). The indicator on productive and sustainable agriculture currently falls into the Tier II category.

Target 2.4: Sustainable agriculture

This document focuses on the indicator for Target 2.4, one of eight targets under SDG 2: “End hunger; achieve food security and improved nutrition and promote sustainable agriculture”. Specifically, Target 2.4 is to “By 2030, ensure sustainable food production systems and implement resilient agricultural practices that increase productivity and production, that help maintain ecosystems, that strengthen capacity for adaptation to climate change, extreme weather, drought, flooding and other disasters and that progressively improve land and soil quality.”

2. Process for developing SDG indicator 2.4.1

Led by FAO and in collaboration with the Global Strategy to improve Agricultural and Rural Statistics (GSARS), work progressed through 2015-18 to establish a methodology to measure progress towards achieving Target 2.4. A two-page methodology note, endorsed by the IAEG-SDG in March 2016, described, in broad terms an approach to the measurement of this indicator of which the most challenging aspect is the definition of productive and sustainable agriculture.

Through 2016 research focused on a broad ranging literature review on “Frameworks and Methods for Measuring and Monitoring Sustainable Agriculture” (Hayati, 2017) conducted by the GSARS. A key aspect of all approaches to measuring sustainable agriculture is the recognition that sustainability is a multi-dimensional concept, which therefore need to be reflected in the construction of the indicator.

A technical meeting was convened in December 2016 involving a number of experts in sustainable agriculture to establish priority areas for measurement for indicator 2.4.1. The results were drawn together to complete a first draft of the methodological paper. That draft was presented to the February 2017 meeting of the Scientific Advisory Committee (SAC) of the GSARS.

Utilizing their feedback, an updated draft was completed to support discussion at an Expert Group Meeting (EGM) held in Rome from 3-5 April, 2017. The EGM gathered agricultural statisticians from

eight countries in all regions, civil society and private sector representatives, as well as thematic experts from academia and from FAO Technical Departments. The purpose of the EGM was to review the methodology developed and to provide guidance on the approach, the dimensions, themes and sub-indicators offered for discussion, as well as the modalities to construct Indicator 2.4.1.

A key aspect in the development of the method was the selection of relevant themes, sub-indicators and the sustainability criteria for each sub-indicator. Following the EGM, detailed descriptions of methods for sub-indicators across all three dimensions of sustainability – economic, environmental and social – were developed and the methodological document was further refined. On the basis of research and discussion, in particular involving engagement with thematic experts, a set of documents was developed to support desk testing of the indicator in selected countries.

In October 2017, the methodological documents were submitted to an online global consultation, inviting all National Offices in charge of agricultural statistics to provide their comments.

In November 2017, the methodology was submitted to the IAEG-SDG at its 6th Meeting in Bahrain. The recommendations of the IAEG-SDG were to wait for the results of the country pilots and re-submit the methodology after having taken their results into account. In addition, the IAEG-SDG provided a series of comments on the approach and methodology.

Pilot desk studies were carried out in Bangladesh, Ecuador, Kyrgyz Republic and Rwanda during the last quarter of 2017, and in Belgium in early 2018. The goal was to test the proposed approach and review the metadata sheets for the respective indicators to: 1) assess its clarity and completeness; 2) take stock of what data are available at a country level; and 3) verify whether the indicator can be constructed using the information already available at the country level. Results are presented in separate reports. In April 2018, participants from the five pilot countries gathered in a technical meeting at FAO to present the results of their desk studies and work out modifications to the methodological document with the team in charge of SDG 2.4.1 development. In 2018-19, cognitive tests of the standalone survey questionnaire developed for SDG 2.4.1 were carried out in Kenya, Mexico and Bangladesh. In collaboration with the Bangladesh Bureau of Statistics, a full scale pilot test to collect data on the survey questionnaire and calculate the indicator was completed in 2019.

Results from the global consultation, the IAEG-SDG, and the country pilots were reviewed and analyzed, and the approach was modified in order to address the issues identified through these processes, resulting in a first revision of the methodology document, dated 22 May 2018. This version was shared with the members of the IAEG-SDG, and two subsequent webinars were organized to present the methodology and discuss IAEG-SDG questions and comments. Member countries were then invited to provide their comments in writing. After taking into account the country comments, the revised methodology was submitted to the 8th meeting of the IAEG-SDG for tier upgrade in October 2018, where it was reclassified as Tier II.

Additional comments were received from countries during the period January to March 2019, aimed at further refining the Biodiversity sub-indicator as part of the 2020 Comprehensive Review of the Global Indicators Framework. In March 2019 an informal and voluntary country-led working group was established with Brazil, Canada, USA, Argentina, Chile, France and Russia as members and FAO as an observer. The group was tasked with identifying scientifically valid, universal and measurable alternative sustainability criteria for the Biodiversity sub-indicator. As a result of an iterative and consultative process, the group submitted a consolidated proposal to FAO for review in August 2019. After the consensus was reached on the final modifications in October 2019, FAO submitted the compromise consensus proposal to the IAEG-SDG, which endorsed it at its Oct 26-28 Meeting. This 07 November 2019 version represents the final endorsed version of the SDG 2.4.1 methodology.

In the next phase, FAO will be working with countries in the collection and reporting data on SDG 2.4.1, in order to support countries in producing it and using it for national policy analysis as well as for SDG reporting.

3. Methodology for constructing the indicator

Note: The following terminology has been used in this document:

- **Indicator:** Overall measure of sustainable agriculture.
- **Dimension:** The dimensions of sustainability: economic, environmental, social.
- **Themes:** Specific areas within a dimension (e.g. land productivity, biodiversity, decent employment, etc.)
- **Sub-indicator:** Variable used to measure performance of the farm in relation with a given theme.
- **Sustainability criteria:** Critical/thresholds values against which the performance of each sub-indicator is assessed to classify the farm in terms of the sustainability level.

Steps involved in constructing the indicator

The following steps were used to derive the indicator for sustainable agriculture. Although these steps are presented in a linear fashion, in practice, a degree of iteration was required through extensive discussion and research. This is especially the case for steps 3, 5 and 6 below in which the description of the relevant approach for assessing sustainability performance depends on the sub-indicator, but at the same time, the choice of sub-indicator is closely informed by the data collection instrument:

1. Determining the **scope** of the indicator: The scope of Indicator 2.4.1 is the agricultural farm holding, and more precisely the agricultural land area of the farm holding, i.e., land used primarily to grow crops and raise livestock. Forestry, fisheries and aquaculture activities may be included to the extent that they are secondary activities conducted on the agricultural area of the farm holding, for example rice-fish farming and similar systems.
2. Determining the **dimensions** to be covered: Indicator 2.4.1 includes environmental, economic and social dimensions in the sustainability assessment.
3. Choosing the **scale** for the sustainability assessment: Indicator 2.4.1 is farm level with aggregation to higher levels.
4. Selecting the data collection **instrument(s)**. It is recommended that indicator 2.4.1 be collected through a farm survey.
5. Selecting the **themes** within each dimension, and choosing a **sub-indicator** for each theme. The sub-indicators should satisfy a number of criteria (described in annex 1 for each sub-indicator).
6. Assessing **sustainability performance at farm level for each sub-indicator**: Specific sustainability **criteria** are applied in order to assess the sustainability level of the farm for each theme according to the respective sub-indicators.
7. Deciding the **periodicity of monitoring the indicator**. It is recommended to be collected at least every three years.
8. **Modality of reporting the indicator**. The set of sub-indicators are presented in the form of a **dashboard**. The dashboard approach offers a response in terms of measuring sustainability at farm level and aggregating it at national level.

Characteristics of Indicator 2.4.1

Indicator 2.4.1 is defined as “Proportion of agricultural area under productive and sustainable agriculture”, which is expressed by the following formula:

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

This implies the need to measure both the extent of land under productive and sustainable agriculture (the numerator), as well as the extent of agricultural land area (the denominator). The numerator is the subject of this note, and its computation is described in the sections “Assessing sustainability performance for each sub-indicator” and “Reporting the indicator at national level”. The denominator,

in turn, is the sum of the agricultural land area (as defined by FAO) utilized by agricultural holdings that are owned (excluding rented-out), rented-in, leased, sharecropped or borrowed.

The methodological note further indicates that the construction of the indicator must respect the following conditions:

- The indicator must reflect the priorities as they are expressed in the SDG target 2.4. and therefore to consider issues related to resilience, productivity, ecosystem maintenance, adaptation to climate change and extreme events, and soils.
- The preferred data source is the farm survey.
- The need to define productive and sustainable agriculture implies the use of criteria to distinguish between sustainable and unsustainable areas.

Measurement scope: the focus is on agricultural production

The scope of Indicator 2.4.1 is the agricultural farm holding, and more precisely the agricultural land area of the farm holding, i.e., land used primarily to grow crops and raise livestock. This choice of scope is fully consistent with the intended use of a country's agricultural land area as the denominator of the aggregate indicator.

More precisely:

Included within scope

- Intensive and extensive crop and livestock production systems
- Subsistence agriculture
- State and common land when used exclusively and managed by the farm holding
- Food and non-food crops and livestock products (e.g. tobacco, cotton, sheep wool)
- Crops grown for fodder or for energy purposes
- Agro-forestry (trees on the agricultural land area of the farm)
- Aquaculture, to the extent that it takes place within the agricultural land area. For example, rice-fish farming and similar systems

Excluded from scope

- State and common land not used exclusively by the farm holding
- Nomadic pastoralism
- Production from gardens and backyards. Production from hobby farms¹
- Holdings focusing exclusively on aquaculture
- Holdings focusing exclusively on forestry
- Food harvested from the wild

Beyond defining the measurement boundary for agricultural production, the following considerations are also to be noted:

First, from an environmental perspective, the scope of the indicator focuses on the environmental impacts of farming within the farm gate, i.e. the direct impacts that farming practices, farmer choices and farming methods have on the environment. For example, the decline in soil health or water pollution within the farm holding due to nutrient imbalance is within scope, but land-use change, specifically the conversion from natural vegetation to agricultural land, is not in scope.

From a social perspective, the approach focuses on farming as a source of livelihood. Thus, the social impact of farming activities in terms of household livelihood and food security is included. Access to

¹ Countries will define hobby farms as per their national criteria and remove these farms from the population of interest for 2.4.1 until an international definition is available.

productive resources, including land, is considered, as it impacts directly the performances of agriculture, but access to basic services, for instance (water, education and health care) for farm households² is considered outside of the scope of the assessment.

In terms of food value chains, the scope being within the agriculture holding, the indicator does not extend to the sustainability of transportation, storage, processing, distribution and marketing of agricultural products. Rather, SDG 12 addresses the issue of sustainable consumption and production of food, and specific indicators exist to capture sustainability in the value chain.

Likewise, the proposed approach does not take into consideration the sustainability of supply chains that provide inputs to agricultural production. For example, the availability and cost of fertilizers will not be captured except to the extent that they affect farm profitability or soil health.

Finally, the impacts of food systems on the health of end-consumers and their dietary outcomes (except for the farm household itself) is outside the scope of the indicator.

Spatial scope: the denominator

An important aspect is to determine the total agricultural land area of a country to be used as denominator for SDG 2.4.1. Agricultural land is defined by FAO as the sum of cropland (arable land plus permanent crops) and permanent meadows and pastures (FAOSTAT [Land Use, Irrigation and Agricultural Practices Questionnaire](#), 2018; SEEA AFF, 2018). National level statistics on agricultural land are collected by FAO from member countries and disseminated in FAOSTAT. Two practical points need to be considered:

- determining the extent to which the coverage and design of the farm survey encompasses the entire agricultural land area;
- determining the extent to which the total land area under the management of farmers (the agricultural farm holding) is different from the associated agricultural land areas. The agricultural holding may be larger than the agricultural land area because it can also include for example, areas left for conservation, farm buildings, etc.

For the purpose of calculating the indicator, the statistical unit is the farm holding to which an agricultural land area is associated. Sustainability for each sub-indicator is likewise assessed at the level of the agricultural land area of the farm holding.

Particular consideration must be given to common land that cannot be clearly associated with a particular farm holding. In some regions, these lands may represent a large percentage of agricultural land areas. This is relevant in many countries where a significant number of farmers, with or without land, rely on livestock farming using common lands (pastoralists, agro-pastoralists).

In line with the World Census of Agriculture, as well as consistently with the farm survey instruments selected to measure indicator 2.4.1 (next section), common land is included within scope insofar as it can be associated with and is under the exclusive control of a particular farm holding. Areas of land that are not managed but used by different farm holdings without any management arrangement are out of scope of indicator 2.4.1.

Farm typology and scope

In some developed countries, farm surveys limit their coverage to farms with a value of operations above a certain monetary threshold in order to exclude hobby farmers. In developing countries, applying this threshold would tend to exclude smaller and subsistence farms whose contribution to total agricultural area and overall sustainability may be substantial. This methodology requires that all

² The definitions of household and non-household sector are based on the World Census of Agriculture 2020 (<http://www.fao.org/3/a-i4913e.pdf>)

types of agricultural holdings be taken into consideration, with the exception of hobby farms, and considering the scope as described above.

Data collection instrument

This methodology is based on the farm survey as main data collection instrument for all sub-indicators, but it also discusses the possibility of using a combination of different data sources as an alternative option for those countries wishing to do so.

By focusing on the farm holding and its agricultural land area, the farm survey offers an opportunity for collecting data through a single instrument for Indicator 2.4.1. This decision is in line with countries' efforts, supported by FAO, to develop farm surveys as the most appropriate tool for generating agricultural statistics.

The decision to focus on a farm survey has implications for the type of information that is possible to capture in order to cover the different dimensions of sustainability. While farm surveys are well suited to measure the economic dimension of sustainability, they may not be the ideal tool for measuring environmental and social sustainability in terms of impact/outcomes.

Typically, environmental impacts of agriculture are measured through monitoring systems like remote sensing, soil and water sampling, or other tools associated with a specific area, rather than within a single agricultural holding. For several environmental themes, it is unlikely that farmers would be able to assess the environmental impact of their farming practices on issues like fertilizer pollution or pesticide use. Using farm survey instead of environmental monitoring systems therefore implies moving from measuring outcome/impact to assessing farmers' behavior. Whenever possible, however, the revised methodology continues to focus on measuring outcomes.

The information in the social dimension themes is generally captured through household surveys. While in the majority of cases agricultural farm holdings are closely associated with a given household, this is not always the case, and therefore care must be given to capturing this information through dedicated survey design.

Defining themes and sub-indicators

Selecting themes

The literature review (Hayati, 2017) identified a large number of potential sustainability themes across the three dimensions of sustainability and, for each theme, usually a large number of possible sub-indicators. The key considerations in the selection of themes are relevance and measurability. In terms of relevance, the relationship between the associated sub-indicator and sustainable agriculture outcomes at farm level should be strong. Following this approach, only sub-indicators that are responsive to farm level policies aimed at productive and sustainable agriculture are considered. In terms of measurability, only a "core" set of themes and sub-indicators, for which measurement and reporting is expected in the majority of countries, are selected.

Two points deserve to be mentioned. First, there are many relevant themes and sub-indicators but, from an operational point of view, it is unfeasible to consider all of them in order to measure progress towards productive and sustainable agriculture. The subject is too complex, and the factors influencing sustainable agriculture too diverse across countries, for reaching a consensus on an indicator that covered all sustainability issues while remaining manageable and universally valid. Measurement of indicator 2.4.1 is therefore operationalized through a core set of 11 themes for global reporting purposes. Countries may consider including **additional themes** to ensure that their national indicator for productive and sustainable agriculture is relevant for national policy-making, yet to ensure international coherence, they are requested to report globally on Indicator 2.4.1 by using the core set of 11 sub-indicators associated with the 11 themes.

Second, the selection of themes for this indicator must be seen in the context of other SDG indicators that cover the full range of economic, environmental and social themes associated with sustainable development. This is especially important when recalling that, for Indicator 2.4.1, the intention is to focus on a farm level assessment of sustainable agriculture, rather than provide information to support a more generalized discussion on the contribution of agricultural activity to various economic, environmental and social outcomes.

Criteria for selecting sub-indicators

Selecting the most appropriate sub-indicator for each theme is a distinct step in the process. For any given theme, there may be multiple sub-indicators that are relevant and/or measurable. Consequently, in selecting the sub-indicators for indicator 2.4.1, the following six key criteria have been considered:

- **Policy relevance:** the indicator must be easily understood (reasons why it is selected) and the results easily interpreted by policy makers (is agricultural productivity and sustainability increased and why? Which policies need to be implemented to address the issue?).
- **Universality:** the indicator must be relevant for all countries in the world, both developing and developed.
- **International comparability:** the way indicators are computed must ensure comparability across countries in order to ensure global reporting. Comparability, however, does not necessarily mean the use of absolute standards. For instance, agricultural wages may be compared with the national minimum wage rate, even if these wage rates vary from one country to another. Similarly, compliance with national environmental standards or nationally recognized certification systems can be considered in computing environmental sub-indicators, even if national criteria vary from one country to another.
- **Measurability:** many themes are important productivity and sustainability issues but their measurement is difficult, complex or would involve costs that cannot be sustained in the framework of a regular monitoring exercise. To the extent possible, alternative measures have been proposed to maintain indicators that are considered relevant while offering feasible measurement solutions.
- **Cost effectiveness:** cost effectiveness is related to measurability. The cost associated with indicator measurement have systematically been considered in relation with the accuracy and reliability of the results obtained through different measurement options.
- **Minimum cross-correlation between sub-indicators:** The set of eleven themes and sub-indicators are meant to have low cross-correlation between them. High cross-correlation would imply that two or more sub-indicators capture the same sustainability issue. In this case, the inclusion of one single sub-indicator, instead of several, would be sufficient to adequately measure agricultural sustainability performances.

Sub-indicators may be of five broad types:

- **Impact/outcome** indicators that record what the state or change in state of environmental, economic and social factors and associated flows of benefits or costs.
- **Awareness** indicators record the level of awareness and knowledge of interviewed persons in relation with a given sustainability issue. Awareness is considered a prerequisite step towards addressing sustainability issues.
- **Behavior** indicators that capture peoples' attitudes in relation to a given sustainability issue. While behavior is influenced by awareness, the two can also be disconnected.
- **Practice** indicators that measure specific and codified agricultural methods applied on a farm.
- **Perception** indicators that record peoples' views about a specific issue.

For the purposes of SDG reporting and consistent application across countries, it is considered that impact/outcome indicators should be the preferred focus of measurement: if an outcome can be

measured, it is the most objective way to measure performance in relation to a given sustainability theme. In the absence of the possibility to measure outcomes, capturing farm behavior through carefully crafted questions can be considered sufficient proxies to assess sustainability performances.

In general however, measuring sustainability performance through farm practices presents several challenges. The impact of a given practice often varies from one place to another, and from one farm type to another, and what can be considered sustainable in one setting may not be suitable in another. Care should be taken, therefore, when proposing indicators on practices to ensure that they are universally relevant in relation with the sustainability issue they are meant to address.

Perception indicators should be used carefully and are not considered to be amenable to the measurement of many sustainability themes as they offer a level of subjectivity hardly acceptable in the computation of an indicator like indicator 2.4.1.

List of sub-indicators

The list of selected themes and sub-indicators is provided in Table 1. In total 11 themes are included. The methodology for the compilation of the sub-indicators and for defining the associated sustainability criteria is described in detail in Annex 1. Annex 1 also lists the minimum set of data items needed to produce the relevant information for the sub-indicator. Moreover, questionnaire modules that contain the minimum set of questions needed to measure each sub-indicator at farm level have also been designed. These questions can be integrated into existing farm surveys for ensuring a comprehensive assessment of indicator 2.4.1.

Table 1: Revised list of themes and sub-indicators (see definitions in Annex and supporting documents)

No.	Theme	Sub-indicators
1	Land productivity	Farm output value per hectare
2	Profitability	Net farm income
3	Resilience	Risk mitigation mechanisms
4	Soil health	Prevalence of soil degradation
5	Water use	Variation in water availability
6	Fertilizer pollution risk	Management of fertilizers
7	Pesticide risk	Management of pesticides
8	Biodiversity	Use of agro-biodiversity-supportive practices
9	Decent employment	Wage rate in agriculture
10	Food security	Food insecurity experience scale (FIES)
11	Land tenure	Secure tenure rights to land

Whenever the farm survey focuses on understanding levels of awareness, farmers' behavior or, in some cases, practices or perception, the questions are crafted in a way to maintain their universal relevance, to the extent possible.

Assessing productivity and sustainability performance through each sub-indicator

For each sub-indicator, criteria to assess sustainability levels are developed. The concept of sustainability implies an idea of continuous progress and improvement towards improved performance across all themes, which can therefore be individually more or less sustainable. In order to capture the concept of continuous progress towards sustainability, a 'traffic light' approach is proposed, in which three sustainability levels are considered for each sub-indicator:

- Green: desirable
- Yellow: acceptable
- Red: unsustainable.

While a certain level of subjectivity is unavoidable, this approach allows identification, for each theme, of conditions of critical unsustainability (red), conditions that can be considered 'ideal' (green) and, in between, intermediate conditions that are considered 'acceptable' but would need to be scrutinized in terms of possible improvements (yellow). This approach also acknowledges the trade-offs that exist between sustainability dimensions and themes, and the need to find an acceptable balance between them.

Each sub-indicator is assessed at the level of the agricultural farm holding. The sustainability level is then associated with the agricultural land area of the agricultural holding. All sub-indicators for a given agricultural farm holding refer to the same underlying agricultural land area.

Progress towards productive and sustainable agriculture: managing trade-offs across sustainability objectives

Achieving productive and sustainable agriculture is a progressive process of identifying and striking a balance between agriculture's social, economic and environmental objectives. This process reflects the evolution of society's knowledge, which has an impact on how sustainability goals and priorities are set in practices. Assessment of agricultural sustainability must therefore be seen as a dynamic process subject to periodic revisions. The traffic light approach helps defining the 'hard boundaries' of unsustainability for each theme, as well as desirable conditions, helping to assess trade-offs across the different sustainability themes. The criteria proposed in this methodology reflect current level of knowledge and broad consensus on sustainability conditions and practices for each sub-indicator. They should be revised periodically to reflect progressive changes in knowledge.

Periodicity

SDG Indicator 2.4.1 measures progress towards more productive and sustainable agriculture. For many sub-indicators, it is likely that changes will be small from one year to another. It is therefore recommended that the survey be conducted every three years. Furthermore, the 3-year periodicity will enable countries to have three data points on the indicator before 2030, assuming that they begin reporting in the early 2020s.

Sampling design

The farm survey's sampling design must respond to the need to capture the structure and the different typologies of agricultural farm holdings. In particular, it is important to develop a specific design for the holdings of the non-household sector (i.e. commercial farms, corporations, etc.). A probabilistic sampling is required to allow the assessment of estimations errors and the extrapolation of the statistics using appropriate sampling weights. Stratification is recommended to improve the precision of the estimations and to produce disaggregated statistics. Possible stratification variables include agricultural farm holding types (household and non-household), agricultural production systems (e.g., crop, livestock, mixed) and other key elements to be considered (e.g., irrigated/non irrigated cropland) and taking into account sub-national specificities. This will allow reporting the indicator at national and sub-national levels and estimating corresponding precisions.

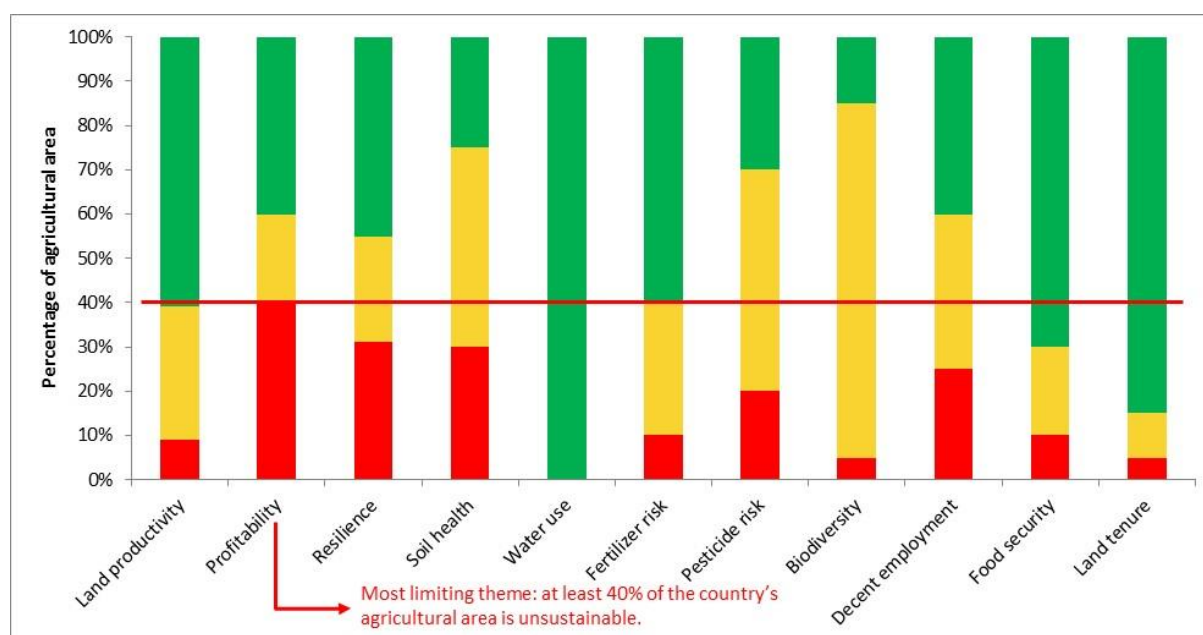
Reporting the indicator

The final step in the sustainability assessment process is to report the results at sub-national and national level. In order to do so at a subnational level, the level of possible geographical disaggregation should be that of the sampling domains of the farm survey, to which the farm data can be extrapolated.

Reporting through a dashboard

The 2.4.1 methodology proposes reporting of indicator 2.4.1 through a national-level dashboard, presenting the different sub-indicators together but independently. The dashboard approach offers several advantages, including the possibility of combining data from different sources and identification of critical sustainability issues, facilitating the search for a balance between the three sustainability dimensions. As a result, countries can easily visualize their performance in terms of the different sustainability dimensions and themes, and understand where policy efforts can be focused for future improvements.

Example of dashboard for SDG Indicator 2.4.1



Computation of results and construction of the dashboard are performed for each sub-indicator separately using the 'traffic light' approach already defined for each sub-indicator: aggregation at national level is performed for each sub-indicator independently, by summing the agricultural land area of each agricultural holdings by sustainability category (red, yellow or green), and reporting the resulting national total as percentage of the total national agricultural land area of all agricultural farm holdings in the country.

In practice, the reported value of Indicator 2.4.1 is determined by the results of most-limiting sub-indicator in terms of sustainability performance (see example above). It should be noted however that, while the national-level dashboard proposed offers an easy tool for reporting the indicator 2.4.1, implementable across a variety of data collection methods, it will systematically over-estimate the proportion of agricultural area under productive and sustainable agriculture, compared to a farm-level dashboard approach. The reason is that different holdings will likely be categorized as unsustainable across different sub-indicators, however this information is lost by aggregating individually at national level. The total area considered 'unsustainable' will therefore likely be higher in reality than by performing nationally-aggregated limiting factors.

Computing Indicator 2.4.1 from the dashboard

The values for reporting indicator 2.4.1 can be calculated as follows:

$$SDG241_d = \min_{n:1-11} (SI_{d\ n})$$

where:

$SDG241_d$ = proportion of agricultural land area that have achieved the 'desirable' level.

$SI_{d\ n}$ = proportion of sub-indicator n that is classified as 'desirable'

min refers to the minimum level of $SI_{d\ n}$ at national level across all 11 sub-indicators

$SDG241_d$ is the proportion of agricultural area for which all sub-indicators are green.

$$SDG241_{a+d} = \min_{n:1-11} (SI_d + SI_a)_n$$

where:

$SDG241_{a+d}$ = proportion of agricultural land area that have achieved at least the 'acceptable' level (estimated by excess, see note below)

$SI_{d\ n}$ = proportion of sub-indicator n that is classified as 'desirable'

$SI_{a\ n}$ = proportion of sub-indicator n that is classified as 'acceptable'

min refers to the minimum level of $(SI_{d\ n} + SI_{a\ n})$ at national level across all 11 sub-indicators

$SDG241_{a+d}$ is the proportion of agricultural area for which all indicators are either green or yellow, an acceptable situation, but that could be improved.

$$SDG241_u = 1 - SDG241_{a+d} = \max_{n:1-11} (SI_{u\ n})$$

where:

$SDG241_u$ = proportion estimated by default of agricultural area that is 'unsustainable' (see note below)

$SI_{u\ n}$ = proportion of sub-indicator n that is classified as 'unsustainable'

max refers to the highest value of $SI_{u\ n}$ across all 11 sub-indicators at national level

$SDG241_u$ = is the proportion of agricultural area for which at least one sub-indicator is unsustainable, and is therefore classified as unsustainable.

The performances of countries over time can be measured by the change in the value of $SDG241_d$ and $SDG241_{a+d}$. An increase over time indicates improvement, while decrease indicates degradation.

Use of alternative data sources to construct the indicator

Several countries have suggested using existing or alternative data sources, such as remote sensing and Geographic Information System (GIS), on the grounds that these instruments can be more cost-effective and sometimes provide more reliable results than farm surveys. The table below indicates possible instruments/sources of information for each sub-indicator.

Table 2: Possible data collection instruments for each sub-indicator

No.	Sub-indicators	Possible data collection instruments
1	Farm output value per hectare	Agricultural surveys, household surveys linked with administrative records and market surveys, remote sensing, agricultural and livestock census
2	Net farm income	Agricultural surveys, household surveys linked with administrative records and market surveys, agricultural and livestock census
3	Risk mitigation mechanisms	Household surveys with agricultural information, community surveys, administrative records
4	Prevalence of soil degradation	Environmental monitoring systems, soil sampling, remote sensing calibrated with ground observations, GIS data/maps/models calibrated with ground observations and samplings
5	Variation in water availability	River flows records, water level records, abstraction records, remote sensing, GIS information/maps/hydrogeological models, administrative sources, household surveys
6	Management of fertilizers	Environmental monitoring systems (soil, water quality), agricultural surveys, GIS data/maps and models based on sale data, agricultural surveys and administrative sources
7	Management of pesticides	Environmental monitoring systems (soil, water quality), agricultural surveys, models based on active substance sale data, agricultural surveys and administrative sources
8	Use of agro-biodiversity-supportive practices	Environmental monitoring systems including remote sensing (land use/land cover), GIS data/maps
9	Wage rate in agriculture	Labor force survey, Household survey with agricultural module, administrative data
10	Food Insecurity Experience Scale (FIES)	Household surveys, health data
11	Secure tenure rights to land	Household surveys with agricultural module, administrative/legal sources

The use of such instruments can be considered, but several aspects need to be carefully taken into account prior to using alternative data sources. First of all, it should be demonstrated that the alternative source gives results of at least same quality as the surveys and ensure international comparability. In order to produce consistent and reliable data as per recommended periodicity, it is advised that the use of alternative data sources may be considered when the available datasets fulfill the following criteria:

- Can be reflected in or attributed to agricultural land area in the country, considering different farm typologies and agricultural regions;
- Can be associated with the country's agricultural productions systems, particularly crops, livestock and the combinations in between;
- Capture the same aspect/phenomenon as the proposed farm survey (as described in the sub-indicator metadata sheets) with at least a documented same quality, considering scientific standards;
- Are representative of the situation at the national level (with respect to agricultural land area) taking into account main agricultural region types;
- Are compliant with international/national standards and classifications systems in order to ensure the indicator to be internationally comparable;
- Data are available at the same level of territorial disaggregation as the farm survey.

- The ways and means to adjust for under-coverage and non-coverage (when needed) should be clearly devised and described;
- Data collection year and periodicity are homogenous across the sub-indicators.

Finally, using different data sources implies that mechanisms should in place at the country level to coordinate regularly the flow of required information generated by various institutions.

Alternative data sources may also be used to complement and/or validate farm survey data. This combined approach has the potential to improve the validity and soundness of results, in particular in countries that have well-established monitoring systems and that are able to produce quality information consistently over time. The information from other sources may be used and leveraged in different ways depending on quality and regularity of its collation. For example:

- Replace farm survey questions, when alternative sources of information are available and respond to the criteria listed above.
- Complement farm survey questions, by providing additional contextual information helpful to interpret the results.
- Crosscheck the farm survey results to identify any inconsistencies and ensure the robustness of the indicator. This validation exercise can be done ex-post or during the data collection by providing the external data to the enumerators before going to the field. In this way, the enumerators can probe whether the responses to the farm survey are consistent with the a priori external knowledge.

Therefore it is recommended that countries complement the farm survey with a monitoring system that can measure the impact of agriculture on the environment (soil, water, fertilizer and pesticide pollution, biodiversity) and on health (pesticides residues in food and human bodies). This will provide additional information and help crosschecking the robustness of indicator 2.4.1 with regard to the environmental dimension of sustainability.

4. References

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Annex: Themes, sub-indicators and metadata sheets

List of themes and related sub-indicators

No.	Theme	Sub-indicator
1	Land productivity	Farm output value per hectare
2	Profitability	Net farm income
3	Resilience	Risk mitigation mechanisms
4	Soil health	Prevalence of soil degradation
5	Water use	Variation in water availability
6	Fertilizer pollution risk	Management of fertilizers
7	Pesticide risk	Management of pesticides
8	Biodiversity	Use of agro-biodiversity-supportive practices
9	Decent employment	Wage rate in agriculture
10	Food security	Food Insecurity Experience Scale (FIES)
11	Land tenure	Secure tenure rights to land

1. Farm output value per hectare

Dimension: Economic

Theme: Land Productivity

Land productivity is a measure of agricultural value of outputs obtained on a given area of land. Maintaining or improving the output over time relative to the area of land used is an important aspect in sustainability for a range of reasons. At farm level, land productivity reflects technology and production processes for given agro-ecological conditions. In a broader sense, an increase in the level of land productivity enables higher production while reducing pressure on increasingly scarce land resources, commonly linked to deforestation and associated losses of ecosystem services and biodiversity.

Coverage: All farm types

Description:

The sub-indicator is described as farm output value per hectare (crop and livestock).

Information on farm outputs and agricultural area should be standard information available from farm surveys thus providing a good basis for assessment at farm level.

- Farm output value: The volume of agricultural output at farm level generally takes into account production of multiple outputs, e.g. crop types and crop and livestock combinations, etc. Since the volume of agricultural outputs is not measured in commensurate units (e.g. not all outputs are measured in tonnes, and tonnes of different output represent different products), it is necessary to establish an appropriate means of aggregation, in this case using a monetary unit. A simple way to enable aggregation is to reflect the multiple outputs produced by a single farm in terms of values (i.e. quantity multiplied by prices).
- Farm agricultural land area: defined as the area of land used for agriculture within the farm³.

Sustainability criteria:

Distance from the 90th percentile of the national distribution⁴:

- Green (desirable): Sub-indicator value is $\geq 2/3$ of the corresponding 90th percentile
- Yellow (acceptable): Sub-indicator value is $\geq 1/3$ and $< 2/3$ of the corresponding 90th percentile
- Red (unsustainable): Sub-indicator value is $< 1/3$ of the corresponding 90th percentile

Data items

Reference period: last calendar year

- 1.1. Quantities of 5 major crops and/or 5 major livestock and its products and by-products produced by the farm holding (both for market and/or self-consumption)

³ According to the SEEA-AFF classification and the classification of the World Agricultural Census 2020

⁴ It is recommended that the 90th percentile and the corresponding 1/3 and 2/3 thresholds are calculated by major types of production system (i.e. by crops, livestock, or mix of crops and livestock; household and non-household sector; and irrigated and non-irrigated farm holdings) and by major agricultural areas of the country. This is to compare the farm holding's productivity with similar farms in same agricultural area.

- 1.2. Farm gate prices of the above quantities produced
- 1.3. Quantities of other on-farm secondary activities carried out and/or commodities produced on the farm holding e.g. aquaculture, agroforestry and others
- 1.4. Farm gate prices of other on-farm activities/commodities
- 1.5. Agricultural land area of the holding

2. Net Farm Income

Dimension: Economic

Theme: Profitability

An important part of sustainability in agriculture is the economic viability of the farm, driven to a large extent by its profitability. Profitability is measured using the net income that the farmer is able to gain from farming operations. Availability and use of information on farm economic performance, measured using profitability, will support better decision making both at micro and macro-economic level. Since performance measures drive behaviour, better information on performance can alter behaviour and decision-making by government and producers both in large-scale commercial farming and medium and small-scale subsistence agriculture.

Coverage: All farms types

Description:

The sub-indicator measures if the farm is consistently profitable over a 3-year period. The focus of this sub-indicator is on income from farming operations as distinct from the total income of the farming household, which may include other sources of income such as, for example, employment in local businesses by other family members, tourism activity, etc.

Formula⁵:

$$NFI = CR + Y_k - OE - Dep + VIC$$

where:

- NFI = Total Net Farm Income
- CR = Total farm cash receipts including direct program payments
- Y_k = Income in kind
- OE = Total operating expenses after rebates (including costs of labour)
- Dep = Depreciation
- VIC = Value of inventory change

Definitions:

- Net farm income refers to the return (both monetary and non-monetary) to farm operators for their labor, management and capital, after all production expenses have been paid (that is, gross farm income minus production expenses). It includes net income from farm production, the value of commodities consumed on the farm, depreciation, and inventory changes.
- Gross farm income refers to the monetary and non-monetary income received by farm. Its main components include cash receipts from the sale of farm products, direct program payments to producers, other farm income (such as income from custom work), value of food and fuel produced and consumed on the same farm, and change in value of year-end inventories of crops and livestock⁶.
- Farm cash receipts include revenues from the sale of agricultural commodities in local currency units that include sales of crops, livestock and its by-products.
- Direct program payments to producers included in farm cash receipts represent the amounts paid under various government and private programs to individuals involved in agricultural production. The payments related to current agricultural production include subsidies to encourage production or to compensate producers for low market returns, payments to stabilize incomes

⁵ The formula and definitions given above have been adopted from Statistics Canada: see <http://www.statcan.gc.ca/pub/21-010-x/21-010-x2014001-eng.pdf>

⁶ Rental value of farm dwellings is not considered as part of farm income.

and payments to compensate producers for crop or livestock losses caused by extreme climatic conditions, disease or other reasons and insurance payments.

- Income-in-kind measures the value of the agricultural goods produced on farms and consumed by farm operator families. It is included to measure total farm production.
- Operating expenses represent business costs incurred by farm businesses for goods and services used in the production process. Expenses include both purchase and self-produced items that are: property taxes, custom work, seeds, rent, fertilizer and lime, chemicals, machinery and building repairs, irrigation, fuel for heating and machines, wages, interest and business share of insurance premiums.
- Depreciation charges account for the economic depreciation or for the loss in fair market value of the capital assets of the farm business. Calculated on farm buildings, farm machinery, and the farm business share of autos, trucks and the farm home, depreciation is generally considered to be the result of aging, wear and tear, and obsolescence. It represents a decrease in the potential economic benefits that can be generated by the capital asset.
- Value of inventory change (VIC) measures the currency value of the physical change in producer-owned inventories. This concept is used to value total agricultural economic production. To calculate VIC, the change in producer-owned inventories (between the end and the beginning of a calendar year) is first derived and then multiplied by the average annual crop prices or value per animal. This calculation is different from the financial or accounting book value approach, which values the beginning and ending stocks, and then derives the change.
- The VIC over all the major commodities can vary widely (depending on the size of the change of inventories and prices). The VIC can be either positive (when inventories are larger at the end of the year compared to the beginning levels) or negative (when year- end inventories are smaller than the levels at the beginning of the year). If the inventory levels are the same at the beginning and end of the year, VIC will be zero despite price changes.

Estimating profitability at a farm level will generally require compilation of basic farm financial records, i.e. daily, weekly, monthly or seasonal transactions in an organized way. In general, large commercial farms maintain detailed financial records however, in case of medium farms and small subsistence agriculture, record keeping is seldom practiced and in most of the countries it doesn't exist at all.

In case when detailed data are not available at farm level, then estimates will be calculated based on farmer declaration of both outputs and inputs quantities and prices. In these cases, depreciation, variation of stocks and taxes may be neglected. This is described below as simplified option (1).

A simplified option (2) is also offered, based on farmer's declaration of the agricultural holding's profitability over the last three calendar years. It is recommended to use this simplified option only when other two options are not feasible.

Sustainability criteria:

For a farm to be profitable the net farm income should be above zero.

- **Green (desirable):** NFI is above zero for past 3 consecutive years
- **Yellow (acceptable):** NFI is above zero for at least 1 of the past 3 consecutive years
- **Red (unsustainable):** below zero for all of the past 3 consecutive years

Data items

Reference period: last three calendar years

Recommended option

Data from farm financial records, i.e. daily, weekly, monthly or seasonal transactions in an organized way (in general, large commercial farms maintain detailed financial records on the basis of which the NFI can be calculated as per above equation).

Simplified option (1)

To be used when the detailed data are not available at farm level (better adapted to smallholders and household sector).

- 2.1 Quantities of 5 major crops and 5 major livestock and its products and by-products produced by the farm holding (both for market and/or self-consumption)
- 2.2 Farm gate prices of the above quantities produced
- 2.3 Operating expenses including inputs quantities and their market prices that were used to produce crops and livestock
- 2.4 Quantities of other on-farm secondary activities carried out and/or commodities produced on the farm holding e.g. aquaculture, agroforestry and others
- 2.5 Farm gate prices of other on-farm activities/commodities
- 2.6 Input quantities and prices that are used to produce other on-farm outputs
- 2.7 Agricultural land area of the farm holding

Simplified option (2)

- 2.1 Respondent's declaration on agricultural holding's profitability over the last 3 calendar years
- 2.2 Agricultural land area of the farm holding

3. Risk mitigation mechanisms

Dimension: Economic

Theme: Resilience

Resilience encompass absorptive, anticipatory and adaptive capacities and refers to the properties of a system that allows farms to deal with shocks and stresses, to persist and to continue to be well-functioning (in the sense of providing stability, predictable rules, security and other benefits to its members).

Coverage: All farms types

Description:

This sub-indicator measures the incidence of the following mitigation mechanisms:

- Access to or availed credit⁷.
- Access to or availed insurance.
- On farm diversification (share of a single agricultural commodity not greater than 66% in the total value of production of the holding).

Access to credit and/or insurance is defined here as when a given service is available and the holder has enough means to obtain the service (required documents, collateral, positive credit history, etc.). Broadly, access to one or more the above 3 factors will allow the farm to prevent, resist, adapt and recover from external shocks such as, floods, droughts, market failure (e.g. price shock), climate shock and pest/animal diseases.

Sustainability criteria:

A farm holding is considered resilient if it has availed or has the means to access the risk mitigation mechanisms as follows:

- **Green (desirable):** Access to or availed at least two of the above-listed mitigation mechanisms.
- **Yellow (acceptable):** Access to or availed at least one of the above-listed mitigation mechanisms.
- **Red (unsustainable):** No access to the listed mitigation mechanisms.

Data items

Reference period: last calendar year

- 3.1. Agricultural holding access to or availed of credit, insurance or other financial instruments:
 - Credit (formal, informal)
 - Insurance
- 3.2 List of other on-farm activities apart from crops and livestock
- 3.3 Value of output for the listed on-farm activities/commodities
- 3.4 Agricultural land area of the farm holding

⁷ Include cash loans and in-kind loans (e.g. seeds provided by another farmer and repaid with a share of the harvest, seeds, etc.) only for agriculture related investments.

4. Prevalence of soil degradation

Dimension: Environmental

Theme: Soil health

Many of the processes affecting soil health are driven by agricultural practices. FAO and the Intergovernmental Technical Panel on Soils (ITPS) have identified 10 main threats to soil functions: soil erosion; soil organic carbon losses; nutrient imbalance; acidification; contamination; waterlogging; compaction; soil sealing; salinization and loss of soil biodiversity.

Coverage: All farms types

Description:

The sub-indicator measures the extent to which agriculture activities affects soil health and therefore represents a sustainability issue. A review of the 10 threats to soil shows that all except one (soil sealing, which is the loss of natural soil to construction/urbanisation) are potentially and primarily affected by inappropriate agricultural practices. Ideally, therefore, all soils under agricultural land area in a country should be the subject of periodic monitoring in order to assess the impact of agriculture on soils. This requires detailed surveys and sampling campaigns, associated with laboratory testing. In order to propose a manageable solution while capturing the main trends in the country in terms of soil health, the farm survey focuses on the four threats that combine the characteristics more widespread (for national monitoring, countries may choose to add any of the other areas indicated above, depending on relevance), and easier to assess through farm surveys:

1. Soil erosion
2. Reduction in soil fertility
3. Salinization of irrigated land
4. Waterlogging
5. Other - specify

The farm survey captures farmer's knowledge about the situation of the agricultural holding in terms of soil degradation. Experience has shown that farmers are very much aware of the state of their soils, health and degradation level. Farmers may also be offered the opportunity to mention other threats than the above four.

Other data sources on soil health may either complement the information collected through the farm survey and offer opportunities for cross-checking farmers' responses; or be used as alternative sources of data. Prior to the farm survey, a desk study could collect all available information on soil health, including using national official statistics or statistics available from international agencies such as FAO. This typically includes maps, models, results from soil sampling, laboratory analysis and field surveys, and all existing report on soil and land degradation at national level. On the basis of this information, maps or tables (by administrative boundaries or other divisions of the country) can be established, showing the threats to soils according to the above 4 categories of threats.

Sustainability criteria:

Proportion of agricultural area of the farm affected by soil degradation.

- **Green (desirable):** The combined area affected by any of the four selected threats to soil health is negligible (less than 10% of the total agriculture area of the farm).
- **Yellow (acceptable):** The combined area affected by any of the four selected threats to soil health is between 10% and 50% of the total agriculture area of the farm.
- **Red (unsustainable):** The combined area affected by any of the four selected threats to soil health is above 50% of the total agriculture area of the farm.

Data items

Reference period: last three calendar years

- 4.1 List of soil degradation threats experienced on the holding
- Soil erosion (loss of topsoil through wind or water erosion)
 - Reduction in soil fertility⁸
 - Salinization of irrigated land
 - Waterlogging
 - Other (Specify)
 - None of the above
- 4.2 Total area of the holding affected by threats related to soil degradation
- 4.3 Agricultural land area of the farm holding

⁸ Reduction in soil fertility will be experienced by farmers as progressive reduction in yield and will be the result of a negative nutrient balance by which the amount of nutrient application (including through mineral and organic fertilizers, legumes, or green manure) is lower than the amount that is lost and exported by crops.

5. Variation in water availability

Dimension: Environmental

Theme: Water use

Agriculture, more specifically irrigated agriculture, is by far the main economic sector using freshwater resources. In many places, water withdrawal from rivers and groundwater aquifers is beyond what can be considered environmentally sustainable. This affects both rivers and underground aquifers. Sustainable agriculture therefore requires that that level of use of freshwater for irrigation remains within acceptable boundaries. While there is no internationally agreed standards of water use sustainability, signals associated with unsustainable use of water typically include progressive reduction in the level of groundwater, drying out of springs and rivers, increased conflicts among water users.

Coverage: All farm types

Description:

The sub-indicator captures the extent to which agriculture contributes to unsustainable patterns of water use. Ideally, the level of sustainability in water use is measured at the scale of the river basin or groundwater aquifer, as it is the combined effect of all users sharing the same resource that impact water sustainability. The farm survey captures farmers' awareness and behaviour in relation with water scarcity, and associates them with three levels of sustainability. These awareness and behaviour are expressed in terms of:

- whether the farmer uses water to irrigate crops on at least 10% of the agriculture area of the farm and why, if the answer is negative (does not need, cannot afford);
- whether the farmer is aware about issues of water availability in the area of the farm and notices a reduction in water availability over time;
- whether there are organizations (water users organisations, others) in charge of allocating water among users and the extent to which these organisations are working effectively.

Other data sources may either complement the farm survey on water use and offer opportunities for cross-checking farmers' responses; or be used as alternative sources of data. Prior to the farm survey, a desk study should collect all available information on water balance, including national official statistics or statistics available from international agencies such as FAO. Information on water resources and use is usually collected by the entities in charge of water management or monitoring and are organised by hydrological entity (river basin or groundwater aquifer). They typically include hydrological records (river flow, groundwater levels), models and maps showing the extent of water use by hydrological entity.

Sustainability criteria:

Farm sustainability in relation with water use will be assessed as follows:

- **Green (desirable):** Water availability remains stable over the years, for farms irrigating crops on more than 10% of the agriculture area of the farm. Default result for farms irrigating less than 10% of their agricultural area
- **Yellow (acceptable):** uses water to irrigate crops on at least 10% of the agriculture area of the farm, does not know whether water availability remains stable over the years, or experiences reduction on water availability over the years, but there is an organisation that effectively allocates water among users.
- **Red (unsustainable):** in all other cases.

Data items

Reference period: last three calendar years

- 5.1 Irrigated agricultural area of the holding
- 5.2 Reduction in water availability experienced on the holding
- 5.3 Existence of organizations dealing with water allocation
- 5.4 Agricultural land area of the farm holding

6. Management of fertilizers

Dimension: Environmental

Theme: Fertilizer pollution risk

Agriculture can affect the quality of the environment through excessive use or inadequate management of fertilizers. Sustainable agriculture implies that the level of chemicals in soil and water bodies remains within acceptable thresholds. Integrated plant nutrient management considers all sources of nutrients (mineral and organic) and their management in order to obtain best nutrient balance. Measuring soil and water quality captures the extent and causes of pollution, but establishing monitoring systems of soil and water is costly and not always feasible in countries.

Note: the management of plant nutrients addresses two sustainability issues: avoiding pollution, and maintaining a good level of soil fertility. This sub-indicator addresses the first issue, while the second one is addressed under sub-indicator 4 'Soil health'.

Coverage: All farm types

Description:

The proposed approach is based on questions to farmers about their use of fertilizer, in particular mineral or synthetic fertilizers and animal manure, their awareness about the environmental risks associated with fertilizer and manure applications, and their behaviour in terms of plant nutrient management⁹. Management measures considered to help reducing risk is as follows:

1. Follow protocols as per extension service or retail outlet directions or local regulations, not exceeding recommended doses
2. Use organic source of nutrients (including manure or composting residues) alone, or in combination with synthetic or mineral fertilizers
3. Use legumes as a cover crop, or component of a multi/crop or pasture system to reduce fertilizer inputs
4. Distribute synthetic or mineral fertilizer application over the growing period
5. Consider soil type and climate¹⁰ in deciding fertilizer application doses and frequencies
6. Use soil sampling at least every 5 years to perform nutrient budget calculations
7. Perform site-specific nutrient management or precision farming¹¹
8. Use buffer strips along water courses.

Sustainability criteria:

Farm sustainability in relation with fertilizer pollution risk will be assessed as follows:

- **Green (desirable):** The farm takes specific measures to mitigate environmental risks (at least four from the list above). Default result for farms not using fertilizers¹².
- **Yellow (acceptable):** the farm uses fertilizers and takes at least two measures from the above list to mitigate environmental risks
- **Red (unsustainable):** farmer uses fertilizer and does not take any of the above specific measures to mitigate environmental risks associated with their use.

⁹ In order to keep the questionnaire manageable, the module does not consider different types of crops or practices. The method therefore assumes that if a farmer reports best practices, these practices are applied over the entire farm. It may therefore over-estimate the area under good practices.

¹⁰ Soil type, combined with climate, and in particular the frequency and intensity of rainfall events, are important elements to consider in deciding fertilizer application doses and frequencies.

¹¹ Precision farming is a farming management concept based on observing, measuring and responding to inter and intra-field variability in crops.

¹² Fertilizers to be considered include mineral and synthetic fertilizers as well as animal manure.

Data items

Reference period: last calendar year

- 6.1 Use of synthetic or mineral fertilizer or animal manure/slurry by the agricultural holding (Y/N)
- 6.2 Specific measures taken to mitigate the environmental risks associated with the excessive use or misuse use of fertilizers as per list below:
- ☐ 1 Follow protocols as per extension service or retail outlet directions or local regulations, not exceeding recommended doses
 - ☐ 2 Use organic source of nutrients (including manure or composting residues) alone, or in combination with synthetic or mineral fertilizers
 - ☐ 3 Use legumes as a cover crop, or component of a multi/crop or pasture system to reduce fertilizer inputs
 - ☐ 4 Distribute synthetic or mineral fertilizer application over the growing period
 - ☐ 5 Consider soil type and climate in deciding fertilizer application doses and frequencies
 - ☐ 6 Use soil sampling at least every 5 years to perform nutrient budget calculations
 - ☐ 7 Perform site-specific nutrient management or precision farming
 - ☐ 8 Use buffer strips along water courses.
- 6.3 Agricultural land area of the farm holding

7. Management of pesticides

Dimension: Environmental

Theme: Pesticide risk

Pesticides are important inputs in modern agriculture (crop and livestock), but if not well managed they can cause harm to people's health or to the environment. Practices associated with integrated pest management (IPM¹³) exist that contribute to minimise risks associated with the use of pesticides and limit their impact on human health and on the environment. The International Code of Conduct on Pesticide Management defines best practice in pesticide management.

Coverage: All farm types

Description:

The proposed sub-indicator is based on information on the use of pesticides on the farms, the type of pesticide used and the type of measure(s) taken to mitigate the associated risks¹⁴. It considers the possibility that the holding adopts specific measures to help reducing risks associated with pesticide use. List of possible measures:

Health

1. Adherence to label directions for pesticide use (including use of protection equipment while applying pesticides)
2. Maintenance and cleansing of protection equipment after use
3. Safe disposal of waste (cartons, bottles and bags)

Environment

1. Adherence to label directions for pesticide application
2. Adopt any of the above good agricultural practices (GAPs): adjust planting time, apply crop spacing, crop rotation, mixed cropping or inter-cropping
3. Perform biological pest control or use biopesticides
4. Adopt pasture rotation to suppress livestock pest population
5. Systematic removal of plant parts attacked by pests
6. Maintenance and cleansing of spray equipment after use
7. Use one pesticide no more than two times or in mixture in a season to avoid pesticide resistance.

¹³ Integrated Pest Management (IPM) is an ecosystem approach to crop production and protection that combines different management strategies and practices to grow healthy crops and minimize the use of pesticides (FAO).

¹⁴ In order to keep the questionnaire manageable, the module does not consider different types of crop or livestock. Thus, the best practices could concern only one crop or livestock, while practices may be different for other ones. The method therefore assumes that if a farmer reports best practices, these practices are applied over the entire farm. It may therefore over-estimate the area under good practices.

Sustainability criteria:

Farm sustainability in relation with pesticides will be assessed as follows:

- **Green (desirable):** The farm uses only moderately or slightly hazardous¹⁵ pesticides (WHO Class II or III). In this case, it adheres to all three health-related measures and at least four of the environment-related measures. Default result for farms not using pesticides.
- **Yellow (acceptable):** The farm uses only moderately or slightly hazardous pesticides (WHO Class II or III) and takes some measures to mitigate environmental and health risks (at least two from each of the lists above)
- **Red (unsustainable):** The farm uses highly or extremely hazardous pesticides (WHO Class Ia or Ib), illegal pesticides¹⁶, or uses moderately or slightly hazardous pesticides without taking specific measures to mitigate environmental or health risks associated with their use (fewer than two from any of the two lists above).

Data items

Reference period: last calendar year

- 7.1 Use of pesticides for crop or livestock by the agricultural holding (Y/N)
- 7.2 Use of highly or extremely hazardous or illegal pesticides by the agricultural holding (Y/N)
- 7.3 Measures taken to protect people from health-related risks associated with pesticides:
 - 1. Adherence to label directions for pesticide use, including use of personal protection equipment (Y/N)
 - 2. Maintenance and cleansing of protection equipment after use (Y/N)
 - 3. Safe disposal of waste (cartons, bottles and bags) (Y/N)
- 7.4 Measures taken to avoid environment-related risks associated with pesticides:
 - 1. Adherence to label directions for pesticide application (Y/N)
 - 2. Adjustment of planting time (Y/N)
 - 3. Application of crop spacing (Y/N)
 - 4. Application of crop rotation (Y/N)
 - 5. Application of mixed cropping (Y/N)
 - 6. Application of inter-cropping (Y/N)
 - 7. Perform biological pest control (Y/N)
 - 8. Use of biopesticides (Y/N)
 - 9. Adopting pasture rotation to suppress livestock pest population (Y/N)
 - 10. Systematic removal of plant parts attacked by pests (Y/N)
 - 11. Maintenance and cleansing of spray equipment after use (Y/N)
 - 12. Use one pesticide no more than two times or in mixture in a season to avoid pesticide resistance (Y/N)
- 7.5 Agricultural land area of the farm holding

¹⁵ WHO Class II or III pesticides as defined by WHO classification

(https://www.who.int/ipcs/publications/pesticides_hazard_rev_3.pdf), or equivalent national classification.

¹⁶ In principle, illegal pesticides refer to any products which do not comply with national regulations on pesticide management, such as un-registered, mislabeled, illegally imported etc. It does not cover "off-label uses," which could be considered as an illegal use action.

8. Use of agro-biodiversity-supportive practices

Dimension: Environmental

Theme: Biodiversity

The Convention on Biological Diversity (CBD) stresses the close relationship between agriculture activities and biodiversity, considering three levels of biodiversity: genetic level diversity; agrobiodiversity at production system level; and ecosystem level (wild) biodiversity. The way agriculture is practiced influences all three levels. Attempts to develop indicators of biodiversity for agriculture systematically consider a large number of sub-indicators, with no universally agreed sustainability criteria. Considering these constraints, and the importance of addressing biodiversity in the construction of Indicator 2.4.1, it is proposed to develop a sub-indicator that captures the efforts towards more sustainable agriculture that better contributes to biodiversity, by identifying a limited list of practices that are conducive to biodiversity conservation.

Coverage: All farm types

Description:

This sub-indicator measures the level of adoption of more sustainable agricultural practices that better contribute to biodiversity by the farm at ecosystem, species and genetic levels. This indicator addresses both crops and livestock. Specifically in the case of this sub-indicator the reference is the entire area of the farm holding as opposed to the agricultural area that is used for rest of the 10 sub-indicators.

In particular, two separate scoring systems depending on the applicability of the organic farming criterion have been proposed. Depending on whether organic certification system exists, countries will select one of the below two proposed set of criteria and thus will be evaluated/scored differently in terms of their sustainability status. According to this formulation, to secure green status, farms in countries with organic certification in place, will have to check 3 out of 6 criteria. On the contrary, farms operating in countries with no organic certification in place, will have to check 2 out of 5 criteria for obtaining the green status.

The detailed formulation of the criteria for the 2 scoring systems is described below:

A. Criteria for countries with organic certification systems/schemes:

1. Leaves at least 10% of the holding area for natural or diverse vegetation. This can include natural pasture/grassland, maintaining wildflower strips, stone and wood heaps, trees or hedgerows, natural ponds or wetlands.
2. Farm produces agricultural products that are organically certified, or its products are undergoing the certification process.
3. Farm does not use medically important antimicrobials as growth promoters.
4. At least two of the following contribute to farm production: 1) temporary crops, 2) pasture, 3) permanent crops, 4) trees on farm, 5) livestock or animal products, and 6) aquaculture.
5. Practices crop or crop/pasture rotation involving at least 2 crops or crops and pastures on at least 80% of the farm cultivated area (excluding permanent crops and permanent pastures) over a period of 3 years. In case of a 2-crop rotation, the 2 crops have to be from different plant genus, e.g. a grass plus a legume, or a grass plus a tuber etc.
6. Livestock includes locally adapted breeds.

Sustainability status:

- Green (desirable): The agricultural holding meets at least three of the above criteria
- Yellow (acceptable): The agricultural holding meets two of the above criteria
- Red (unsustainable): The agricultural holding meets none of the above criteria

B. Criteria for countries with no organic certification systems/schemes:

1. Leaves at least 10% of the holding area for natural or diverse vegetation. This can include natural pasture/grassland, maintaining wildflower strips, stone and wood heaps, trees or hedgerows, natural ponds or wetlands.
2. Farm does not use medically important antimicrobials as growth promoters.
3. At least two of the following contribute to farm production: 1) temporary crops, 2) pasture, 3) permanent crops, 4) trees on farm, 5) livestock or animal products, and 6) aquaculture
4. Practices crop or crop/pasture rotation involving at least 2 crops or crops and pastures on at least 80% of the farm cultivated area (excluding permanent crops and permanent pastures) over a period of 3 years. In case of a 2-crop rotation, the 2 crops have to be from different plant genus, e.g. a grass plus a legume, or a grass plus a tuber etc.
5. Livestock includes locally adapted breeds.

Sustainability status:

- Green (desirable): The agricultural holding meets at least two of the above criteria
- Yellow (acceptable): The agricultural holding meets one of the above criteria
- Red (unsustainable): The agricultural holding meets none of the above criteria

Data items

Reference period: last calendar year

- 8.1 Percentage of the holding area covered by natural or diverse vegetation (not cultivated), including natural pasture or grasslands; wildflower strips; stone or wood heaps; trees or hedgerows; natural ponds or wetlands
- 8.2 Farm produced products (crops and/or livestock) that are organically certified (Y/N)
- 8.3 Farm produced products (crops and/or livestock) that are undergoing organic certification (Y/N)
- 8.4 Report the holding organic certification number
- 8.5 Report the name of organic certifying body
- 8.6 Area on which certified organic [CROP/LIVESTOCK] was produced
- 8.7 Use of medically important antimicrobials as growth promoter for livestock (Y/N)
- 8.8 Value of production of the holding (covered by sub-indicator 1)
 - ☐ 1 Temporary crops
 - ☐ 2 Pastures
 - ☐ 3 Permanent crops
 - ☐ 4 Trees on farm
 - ☐ 5 Livestock and animal products
 - ☐ 6 Aquaculture

- 8.9 Percentage of the cultivated area on which crop rotation or crop/pasture rotation involving at least two crops (excluding permanent crops and permanent pastures) from different plant genus is practiced over a 3 year period
- 8.10 Area of the agricultural holding covered by the (up to 5) main crops listed for sub-indicator 1 (excluding pasture)
- 8.11 List of different breeds and cross-breed and percentage of animals they represent for each animal species
- 8.12 Entire area of the farm holding

9. Wage rate in agriculture

Dimension: Social

Theme: Decent employment

The theme provide information on the remuneration of employees working for the farm and belonging to the elementary occupation group, as defined by the International Standard Classification of Occupation (ISCO-08 - code 92). It informs about economic risks faced by unskilled workers (those performing simple and routine tasks) in terms of remuneration received, the later benchmarked against the minimum wage set at national level in the agricultural sector. This sub-indicator allows distinguishing between holdings that pay a fair remuneration to its employees under the elementary occupation group, and agricultural holdings paying a remuneration to their employees belonging to the elementary occupation group that is below the minimum wage standard. In the latter case, agricultural holdings are deemed to be non-sustainable since the remuneration paid is not sufficient to ensure a decent living standard.

Coverage: Not applicable to farms that employ only family labour.

Description:

The sub-indicator measures the farm unskilled labour daily wage rate in Local Currency Units (LCU).

$$\text{Daily wage rate of unskilled hired labor} = \frac{\text{Total annual compensation}}{\text{Total annual hours worked}} * 8 \text{ hour}$$

Where; compensation is both monetary and in kind payments expressed in Local Currency Units (LCU).

Sustainability criteria:

Unskilled labour wage rate in relation to national or agriculture sector minimum wage rate. In case there is no national or agriculture sector minimum wage rate, the national poverty line is used instead:

- **Green (desirable):** If the wage rate paid to unskilled labour is above the minimum national wage rate or minimum agricultural sector wage rate (if available). Default result for farms not hiring labour.
- **Yellow (acceptable):** if the wage rate paid to unskilled labour is equals to the minimum national wage rate or minimum agricultural sector wage rate (if available).
- **Red (unsustainable):** if the wage rate paid to unskilled labour is below the minimum national wage rate or minimum agricultural sector wage rate (if available).

Data items

Reference period: last calendar year

- 9.1 Unskilled workers hired on the agricultural holding (Y/N)
- 9.2 Average pay in-cash and/or in-kind paid to the hired unskilled worker per day (of 8 hours)
- 9.3 Minimum agricultural sector wage rate (if available) or minimum national wage rate
- 9.4 Agricultural land area of the farm holding

10. Food Insecurity Experience Scale (FIES)

Dimension: Social

Theme: Food security

FIES is a metric of severity of food insecurity at the household level that relies on people's direct yes/no responses to eight simple questions regarding their access to adequate food. It is a statistical measurement scale similar to other widely-accepted statistical scales designed to measure unobservable traits such as aptitude/intelligence, personality, and a broad range of social, psychological and health-related conditions.

Coverage: Only household farms

Description:

The Food Insecurity Experience Scale (FIES) produces a measure of the severity of food insecurity experienced by individuals or households, based on direct interviews. The FIES questions refer to the experiences of the individual respondent or of the respondent's household as a whole.

The FIES is derived from two widely-used experience-based food security scales: the U.S. Household Food Security Survey Module and the Latin American and Caribbean Food Security Scale (Spanish acronym ELCSA). It consists of a set of eight short yes/no questions asked directly to people. The questions focus on self-reported, food-related behaviours and experiences associated with increasing difficulties in accessing food due to resource constraints. The FIES is based on a well-grounded construct of the experience of food insecurity composed of three domains: uncertainty/anxiety, changes in food quality, and changes in food quantity.

This sub-indicator is SDG indicator 2.1.2 contextualised for a farm survey.

Sustainability criteria: Level on FIES scale

- **Green (desirable): Mild food insecurity**¹⁷
- **Yellow (acceptable)**¹⁸: **Moderate food insecurity**
- **Red (unsustainable): Severe food insecurity**

Data items

Reference period: last 12 months

- 10.1 The respondent's recollection that he/she (or any other adult in the household) would be worried about not having enough food to eat due to lack of money or other resources
- 10.2 The respondent's recollection that he/she (or any adult in the household) was unable to eat healthy and nutritious food because of lack of money or other resources
- 10.3 The respondent's recollection that he/she (or any adult in the household) only ate a few kinds of food due to lack of money or other resources

¹⁷ Computation of food insecurity level is described in details in e-learning course on SDG 2.1.2:

<http://www.fao.org/elearning/#/elc/en/course/SDG212>

¹⁸ The terminology "Acceptable" must be read within the context of SDG 2.4.1; it should be interpreted as a situation that nevertheless merits attention and actions aimed at improvement.

- 10.4 The respondent's recollection that he/she (or any adult in the household) had to skip a meal because there was no enough money or other resources for food
- 10.5 The respondent's recollection that he/she (or any adult in the household) ate less than he/she thought he should due to lack of money or other resources
- 10.6 The respondent's recollection that his/her household ran out of food because of a lack of money or other resources
- 10.7 The respondent's recollection that he/she (or any adult in the household) was hungry but not eating due to lack of money or other resources for food
- 10.8 The respondent's recollection that he/she (or any adult in the household) did not eat for a whole day because of a lack of money or other resources
- 10.9 Agricultural land area of the farm holding

11. Secure tenure rights to land

Dimension: Social

Theme: Land tenure

The sub-indicator allows assessing sustainability in terms of rights over use of agricultural land areas. Since agricultural land is a key input for agricultural production, having secure rights over land ensures that the agricultural holding controls such a key asset and does not risk losing the land used by the holding for farming.

Evidence shows that farmers tend to be less productive if they have limited access to and control of economic resources and services, particularly land. Long-lasting inequalities of economic and financial resources have positioned certain farmers at a disadvantage relative to others in their ability to participate in, contribute to and benefit from broader processes of development.

As such, adequate distribution of economic resources, particularly land, help ensure equitable economic growth, contributes to economic efficiency and has a positive impact on key development outcomes, including poverty reduction, food security and the welfare of households.

This sub-indicator is SDG indicator 5.a.1, customised for SDG indicator 2.4.1.

Coverage: All farms types

Description:

The sub-indicator measures the ownership or secure rights over use of agricultural land areas using the following criteria:

- Formal document issued by the Land Registry/Cadastral Agency
- Name of the holder listed as owner/use right holder on legally recognized documents
- Rights to sell any of the parcel of the holding
- Rights to bequeath any of the parcel of the holding

Sustainability criteria:

Level of security of access to land:

- **Green (desirable):** has a formal document with the name of the holder/holding on it, or has the right to sell any of the parcel of the holding, or has the right to bequeath any of the parcel of the holding
- **Yellow (acceptable):** has a formal document even if the name of the holder/holding is not on it
- **Red (unsustainable):** no positive responses to any of the 4 questions above

Data items

Reference period: last calendar year

11.1 Type of formal document for any of the agricultural land of the holder/holding that it holds (alternatively 'possess, use, occupy) issued by the Land Registry/Cadastral Agency

- ☐ 1 Title deed
- ☐ 2 Certificate of customary tenure
- ☐ 3 Certificate of occupancy
- ☐ 4 Registered will or registered certificate of hereditary acquisitions
- ☐ 5 Registered certificate of perpetual / long term lease
- ☐ 6 Registered rental contract
- ☐ 7 Other

- 11.2 Name of any member of the holding listed as an owner or use right holder on any of the legally recognized documents
- 11.3 The right of the holder/holding to sell any of the parcel of the holding
- 11.4 The right of the holder/holding to bequeath any of the parcel of the holding
- 11.5 Agricultural land area of the farm holding