Food and Agriculture Organization
of the United Nations

Session: 2

SDG Indicator 2.4.1 – *The Indicator's Framework*

Seminar session: Measuring and Monitoring Sustainable Agriculture

10 May 2023

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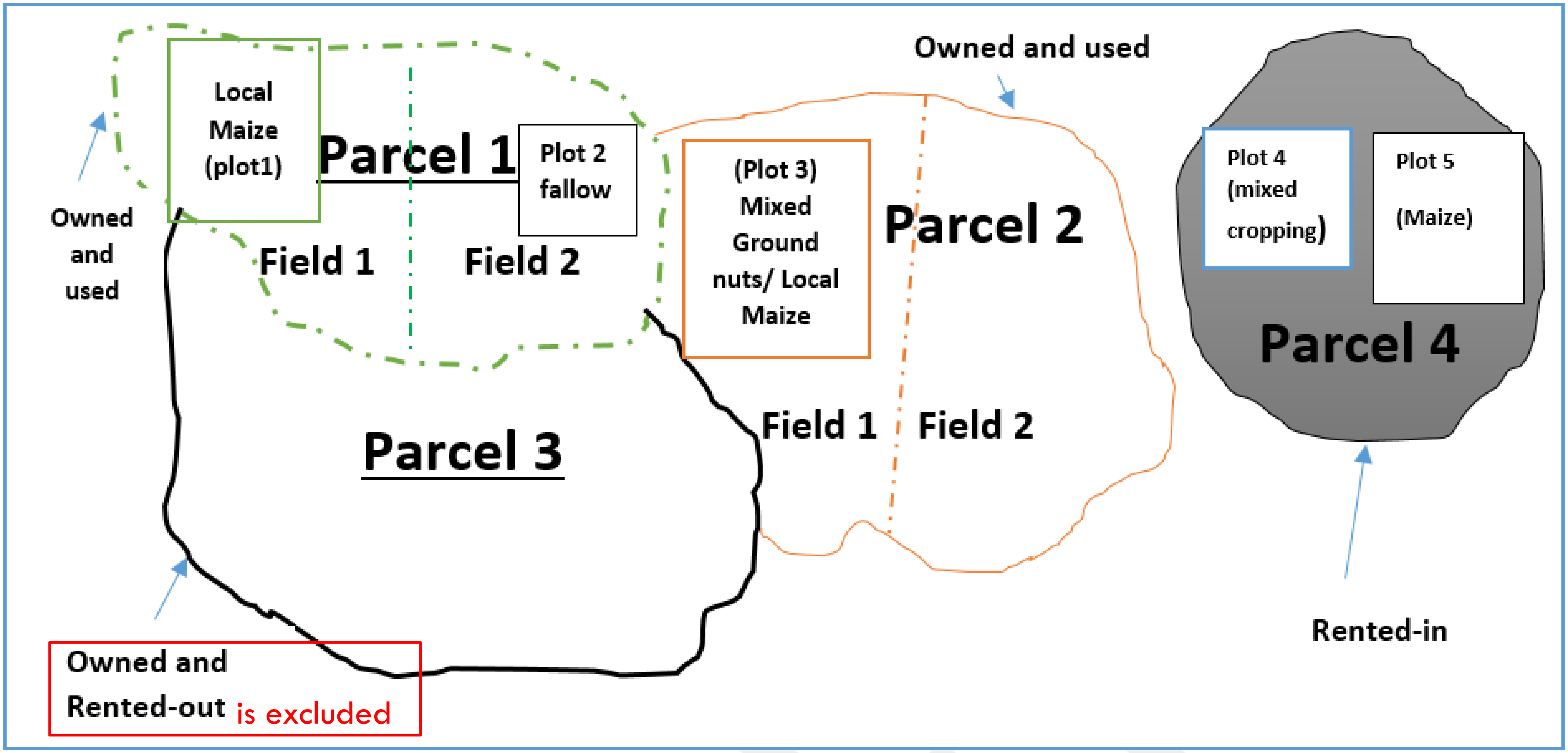
ESS Division (FAO)

DENOMINATOR OF THE INDICATOR

$$SDG\ 2.4.1 = \frac{Area\ under\ productive\ and\ sustainable\ agriculture}{\mathbf{Agricultural\ land\ area}}$$

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

LAND TENURE



Owned and operated: Included

Rented-in: Included

Other (occupied, borrowed for free, including common land managed by the holding): Included

INDICATOR'S FRAMEWORK

Dimension	Theme	Sub-indicator	Farm type	Reference period
Economic	1. Land productivity	Farm output value per hectare	All types	Last calendar yr.
	2. Profitability	Net farm income	All types	Last 3 calendar yrs.
	3. Resilience	Risk mitigation mechanisms	All types	Last calendar yr.
Environmental	4. Soil health	Prevalence of soil degradation	All types	Last 3 calendar yrs.
	5. Water use	Variation in water availability	All types	Last 3 calendar yrs.
	6. Fertilizer risk	Management of fertilizers	All types	Last calendar yr.
	7. Pesticide risk	Management of pesticides	All types	Last calendar yr.
	8. Biodiversity	Use of agro-biodiversity supportive practices	All types	Last calendar yr.
Social	9. Decent employment	Wage rate in agriculture	Farms hiring unskilled labour	Last calendar yr.
	10. Food security	Food Insecurity Experience Scale (FIES)	Household farms	Last 12 months
	11. Land tenure	Secure tenure rights to land	All types	Last calendar yr.

1. FARM OUTPUT VALUE PER HECTARE

Dimension	Theme	Sub-indicator	Farm type	Reference period
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1. FARM OUTPUT VALUE PER HECTARE

Formula: Variables and data items:

$$\boldsymbol{Farm\ output\ value\ per\ hectare} = \frac{Farm\ output\ value\ (LCU)}{Agricultural\ land\ area\ (in\ hectares)}$$

1) Value of output = Quantities x farm gate prices of:

- ✓5 main crops and its by-products produced by the holding in a reference period
- ✓5 main livestock and its products produced by the holding in a reference period
- ✓Other on-farm products produced by the holding in a reference period

2) Agricultural land area of the farm

3) Categories of farms

4) Farm output value per hectare the entire distribution of farms selected as part of the sample

1. FARM OUTPUT VALUE PER HECTARE

Classify the agricultural area of the farm according to the following sustainability criteria:

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 for the category of farms it belongs to. This is to say that, for each category of farm, the computed farm output value per hectare must be benchmarked against the following thresholds for sustainability by category:

Green (desirable): if the farm FOVH is equal to or greater than the value corresponding to 2/3 of the 90th percentile (estimated for the distribution of categories of farms to which this farm belongs)

Yellow (acceptable): if the farm FOVH is equal to or greater than the value corresponding to 1/3 but less than 2/3 of the 90th percentile (estimated for the distribution of categories of farms to which this farm belongs)

Red (unsustainable): if the farm FOVH is less than the value corresponding to 1/3 of the 90th percentile (estimated for the distribution of categories of farms to which this farm belongs)

Calculate proportion of agricultural area for the indicator by sustainability status

2. NET FARM INCOME (NFI)

Dimension	Theme	Sub-indicator	Farm type	Reference period
Economic	1. Land productivity	Farm output value per hectare	All types	Last calendar yr.
	2. Profitability	Net farm income	All types	Last 3 calendar yrs.
	3. Resilience	Risk mitigation mechanisms	All types	Last calendar yr.
Environmental	4. Soil health	Prevalence of soil degradation	All types	Last 3 calendar yrs.
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	10. Food security	Food Insecurity Experience Scale (FIES)	Household farms	Last 12 months
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2. NET FARM INCOME (NFI)

Data items: Can be computed according to two approaches i.e. sophisticated or simplified options:

Sophisticated option:

Calculate Net Farm Income using formula:

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

NFI = Total Net Farm Income

CR = Total farm cash receipts including direct program payments

$\boldsymbol{Y_k}$ = Income in kind

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

Dep = Depreciation

Δ Inv = Value of inventory change.

SIMPLIFIED OPTIONS

Simplified option (1):

To be used when the detailed data are not available at farm level (better adapted to smallholders and household sector):

- Output quantity and farm gate prices of crops and livestock and its products and by-products marketed or self-consumed
- Operating expenses including i.e. inputs quantity and its market prices
- Output quantity and farm gate prices of other on-farm activities carried out on the holding e.g. aquaculture or agroforestry (in addition to crops and livestock)
- Input quantity and prices utilized in the production of the other on-farm outputs

For this option depreciation and value of inventory change are not considered.

Simplified option (2):

- Respondent's declaration on agricultural holding's profitability over the last 3 calendar years.
- Simplified option 2 is used in case of SDG indicator survey questionnaire

2. NET FARM INCOME (CONT'D)

Classify the agricultural area of the farm according to the following sustainability criteria:

Green (desirable): NFI/profitability is above zero for all past 3 consecutive years

Yellow (acceptable): NFI/profitability is above zero for at least 1 of the past 3 consecutive years

Red (unsustainable): NFI/profitability is below zero for all of the past 3 consecutive years

3. RISK MITIGATION MECHANISMS

Dimension	Theme	Sub-indicator	Farm type	Reference period
Economic	1. Land productivity	Farm output value per hectare	All types	Last calendar yr.
	2. Profitability	Net farm income	All types	Last 3 calendar yrs.
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3. RISK MITIGATION MECHANISMS

Risk mitigation mechanisms:

1. Access to or availed Insurance
2. Access to or availed Credit (both formal, informal)
3. On farm diversification (i.e. share of a single agricultural commodity or activity is 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 (i.e. the 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.

3. RISK MITIGATION MECHANISMS (RMM)

On-farm diversification. It captures the share of the value of production of one single agricultural commodity over total value of production of the agricultural. This variable is calculated according to the below formula:

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

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

SUSTAINABILITY CRITERIA

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 three mitigation mechanisms.

Yellow (acceptable): Access to or availed at least one of the three mitigation mechanisms.

Red (unsustainable): No access to the three mitigation mechanisms.

4. PREVALENCE OF SOIL DEGRADATION

Dimension	Theme	Sub-indicator	Farm type	Reference period
Economic	1. Land productivity	Farm output value per hectare	All types	Last calendar yr.
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4. PREVALENCE OF SOIL DEGRADATION

4 main threats:

1. Soil erosion
2. Reduction in soil fertility
3. Salinization
4. Waterlogging
5. Other – specify
6. None of the above

SUSTAINABILITY CRITERIA

<u>Classify the agricultural area of the farm according to the following sustainability criteria:</u>

Green (desirable): The combined area affected by any of the four selected threats to soil health is 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.

5. VARIATION IN WATER AVAILABILITY

Dimension	Theme	Sub-indicator	Farm type	Reference period
Economic	1. Land productivity	Farm output value per hectare	All types	Last calendar yr.
	2. Profitability	Net farm income	All types	Last 3 calendar yrs.
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	10. Food security	Food Insecurity Experience Scale (FIES)	Household farms	Last 12 months
	11. Land tenure	Secure tenure rights to land	All types	Last calendar yr.

5. VARIATION IN WATER AVAILABILITY (VWA)

Classify the agricultural area of the farm according to the following sustainability criteria:

Green (desirable): Water availability remains stable over the years for farms irrigating crops on more than 10% of its agriculture area. 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

6. MANAGEMENT OF FERTILIZERS

Dimension	Theme	Sub-indicator	Farm type	Reference period
Economic	1. Land productivity	Farm output value per hectare	All types	Last calendar yr.
	2. Profitability	Net farm income	All types	Last 3 calendar yrs.
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6. MANAGEMENT OF FERTILIZERS

Management 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

6. MANAGEMENT OF FERTILIZERS

<u>Classify the agricultural area of the farm according to the following sustainability criteria:</u>

Green (desirable): The farm uses fertilizers but take 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

7. MANAGEMENT OF PESTICIDES

Dimension	Theme	Sub-indicator	Farm type	Reference period
Economic	1. Land productivity	Farm output value per hectare	All types	Last calendar yr.
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7. MANAGEMENT OF PESTICIDES

Health measures:

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)

Environmental measures:

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

7. MANAGEMENT OF PESTICIDES

Classify the agricultural area of the farm according to the following sustainability criteria:

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).

8. USE OF AGRO-BIODIVERSITY-SUPPORTIVE PRACTICES

Dimension	Theme	Sub-indicator	Farm type	Reference period
Economic	1. Land productivity	Farm output value per hectare	All types	Last calendar yr.
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	11. Land tenure	Secure tenure rights to land	All types	Last calendar yr.

USE OF AGRO-BIODIVERSITY-SUPPORTIVE PRACTICES

Set of criteria for countries with no organic certification:

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.

USE OF AGRO-BIODIVERSITY-SUPPORTIVE PRACTICES

Set of criteria for countries with organic certification:

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 (applies only to countries with certification)
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.

8. USE OF BIODIVERSITY-SUPPORTIVE PRACTICES (UBSP)

Classify the agricultural area of the farm according to the following sustainability criteria:

Sustainability status for countries with organic:

- Green (desirable): The agricultural holding meets at least **three of the above** criteria
- Yellow (acceptable): The agricultural holding meets at least **one of the above** criteria
- Red (unsustainable): The agricultural holding meets **none of the above** criteria

Sustainability status for countries with no organic:

- Green (desirable): The agricultural holding meets at least **two of the above** criteria
- Yellow (acceptable): The agricultural holding meets at least **one of the above** criteria
- Red (unsustainable): The agricultural holding meets **none of the above** criteria

Calculate the proportion of agricultural area by sustainability status

9. WAGE RATE IN AGRICULTURE

Dimension	Theme	Sub-indicator	Farm type	Reference period
Economic	1. Land productivity	Farm output value per hectare	All types	Last calendar yr.
	2. Profitability	Net farm income	All types	Last 3 calendar yrs.
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	7. Pesticide risk	Management of pesticides	All types	Last calendar yr.
	8. Biodiversity	Use of agro-biodiversity supportive practices	All types	Last calendar yr.
Social	9. Decent employment	Wage rate in agriculture	Farms hiring unskilled labour	Last calendar yr.
	10. Food security	Food Insecurity Experience Scale (FIES)	Household farms	Last 12 months
	11. Land tenure	Secure tenure rights to land	All types	Last calendar yr.

9. WAGE RATE IN AGRICULTURE

Calculate the daily wage rate according to the following formula:

$$Daily\ wage\ rate\ \ paid\ \ to\ unskilled\ worker = \frac{total\ annual\ compensation}{total\ annual\ hours\ worked} * 8$$

Classify the agricultural area of the farm according to the following sustainability criteria:

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).

10. FOOD INSECURITY EXPERIENCE SCALE (FIES)

Dimension	Theme	Sub-indicator	Farm type	Reference period
Economic	1. Land productivity	Farm output value per hectare	All types	Last calendar yr.
	2. Profitability	Net farm income	All types	Last 3 calendar yrs.
	3. Resilience	Risk mitigation mechanisms	All types	Last calendar yr.
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FOOD INSECURITY EXPERIENCE SCALE (FIES)
THE EIGHT QUESTIONS

FIES 8 Questions_Explaine

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

3: CALCULATION OF THE SUSTAINABILITY STATUS OF THE AGRICULTURAL HOLDING:

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 severe 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 severe 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 severe food insecure is greater than 0.5.

Calculate the proportion of agricultural area by sustainability status of the household farm

Important note: Acceptable * **here is used to be consistent with FAO terminology used in context of 2.4.1. This level of moderate food insecurity is by no means endorsed by FAO to be acceptable.**

11. SECURE TENURE RIGHTS TO LAND

Dimension	Theme	Sub-indicator	Farm type	Reference period
Economic	1. Land productivity	Farm output value per hectare	All types	Last calendar yr.
	2. Profitability	Net farm income	All types	Last 3 calendar yrs.
	3. Resilience	Risk mitigation mechanisms	All types	Last calendar yr.
Environmental	4. Soil health	Prevalence of soil degradation	All types	Last 3 calendar yrs.
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11. SECURE TENURE RIGHTS TO LAND

Classify farms by sustainability status according to the following criteria:

Green (desirable): has a formal document with the name of the holder/holding on it, or has the right to sell or 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 criteria listed

THANK YOU

Contact us:

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